DOCUMENT RESUME

ED 396 962 SE 058 712

AUTHOR Haslam, M. Bruce; And Others
TITLE Evaluation of the Dwight D. Eisenhower Mathematics and Science Regional Consortiums Program: First Interim Report, 1996.
INSTITUTION Policy Studies Associates, Inc., Washington, DC.; SRI International, Menlo Park, Calif.
SPONS AGENCY Department of Education, Washington, DC. Office of the Under Secretary.
PUB DATE 96
CONTRACT EA93061001
NOTE 72p.
PUB TYPE Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS Demonstration Programs; Elementary Secondary Education; Federal Aid; *Federal Programs; *Mathematics Education; Professional Development; *Science Education
IDENTIFIERS *Dwight D Eisenhower Math and Science Educ Program

ABSTRACT

This report provides a description of the Dwight D. Eisenhower Mathematics and Science Regional Consortiums Program's early operations as a first step in a study that will later offer more evaluative judgments. In this first round of evaluation, the report seeks to describe the federal formulation of the program's purpose, early organization of the Consortia, and work of the Consortia. The principal categories of activities observed in the program are: professional development, support for state teams and regional networks, task-specific assistance, dissemination, purchasing materials and equipment, and networking among the Regional Consortia. In its early stages, the Regional Consortiums Program has sought to build a broad base of participation in planning and carrying out tasks intended to support reform. Accordingly, there has been more emphasis on regional and intergovernmental process than on mathematics and science context although content has not been absent from the program. It is not yet clear whether an emphasis on process will continue to be characteristic of this program or whether it represents a stage that the Consortia will outgrow. (MKR)

Evaluation of the Dwight D. Eisenhower Mathematics and Science Regional Consortiums Program: First Interim Report

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U.S. DEPARTMENT OF EDUCATION • OFFICE OF THE UNDER SECRETARY

Evaluation of the Dwight D. Eisenhower Mathematics and Science Regional Consortiums Program: First Interim Report

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Prepared for:

U.S. Department of Education
Office of the Under Secretary of Education
Planning and Evaluation Service
Washington, DC 20202

Prepared by:

M. Bruce Haslam, Policy Studies Associates
Kelly Colopy, Policy Studies Associates
Brenda J. Turnbull, Policy Studies Associates

With the assistance of:

Lee Anderson, SRI International
Daniel C. Humphrey, SRI Intternational
Camille Marder, SRI International
Patrick M. Shields, SRI International

SRI Project 5306

This report was prepared pursuant to Contract Number EA93061001, U.S. Department of Education (Nancy Loy, Project Officer).

We wish to acknowledge the special contributions of our expert reviewers for the Eisenhower State Curriculum Frameworks Projects and Regional Consortiums Program Evaluation:

Walter Secada, University of Wisconsin-Madison
Rodger Bybee, Biological Sciences Curriculum Study
Curtis McKnight, University of Oklahoma
Senta Raizen, Network, Inc.

This evaluation was enhanced by the collaboration between the Eisenhower Evaluation and the National Science Foundation-sponsored study of curriculum frameworks conducted by the Council of Chief State School Officers and led by Rolf Blank. We wish to thank Susan Gross of NSF and Rolf Blank for their efforts. We also wish to acknowledge the contributions of the joint expert group that served both studies:

Walter Secada, Chair, University of Wisconsin-Madison
Charles Allan, Michigan Department of Education
Douglas Archbald, University of Delaware
Joan Baron, Connecticut Department of Education
Rodger Bybee, Biological Sciences Curriculum Study
Iris Carl, past president of the National Council of Mathematics Teachers
Donald Chambers, University of Wisconsin-Madison
Curtis McKnight, University of Oklahoma
Celeste Pea, Louisiana Systemic Initiative
Senta Raizen, Network, Inc.
Andy Reeves, National Council of Teachers of Mathematics
Charles Warren, Ohio State Department of Education

In addition, we would like to thank Mary Johnson of the U.S. Department of Defense Dependents Schools and the following individuals from the U.S. Department of Education for their helpful comments:

Eve Bither
Alicia Coro
John Egermeier
Alan Ginsburg
Chuck Lovett
Nancy Loy
Valena Plisko
Patricia O'Connell Ross
Charles Stalford
Eisenhower Professional Development Program Federal Activities staff

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EXHIBIT

EXECUTIVE SUMMARY

The Dwight D. Eisenhower Mathematics and Science Regional Consortiums Program has provided about $15 million per year since 1992 to 10 regional organizations. During the first phase of the study, nine of the grant recipients were regional educational laboratories; the tenth was the College Board, with a laboratory as subcontractor. The Consortia are carrying out a statutory charge to assist in the improvement of local instruction in mathematics and science. As the program was framed by the U.S. Department of Education, successfully meeting this charge depends in part on working with the states in standards-based systemic reform, in coordination with a range of other federally funded reform initiatives.

This report provides a description of the Regional Consortia's early operations as a first step in a study that will later offer more evaluative judgments. In this first round of the evaluation, we have sought to describe the federal formulation of the program's purpose, the early organization of the Consortia, and the work of the Consortia.

This program has encompassed a variety of early directions, which this report attempts to sort out analytically. For example, the initial visions of this program put forward by Congress (in the authorizing statute) and the Administration (in a *Federal Register* announcement) were not identical. Then, as the Consortia began offering services in their regions, each developed its own array of initiatives and attempted to find its own niches. Under the circumstances, the first job of this evaluation has been simply to map what the Consortia are doing within a reasonably simple and uniform analytic framework of six categories—a framework created by and for this evaluation. The principal categories of activities that we have observed in this program are the following:

- **Professional development.** Across the Regional Consortia, there is a strong commitment to professional development for teachers and other educators who are engaged in improving mathematics and science education. Documents from the Consortia as well as our interviews with Consortia managers and staff indicate that these investments account for a substantial portion of the Consortia's annual budgets. The Consortia support professional development in two general ways. First, they pay for professional development conducted by third-party providers and/or for teachers and other educators to participate in professional development. Second, the Consortia conduct the professional development themselves. Consortia-supported professional development includes both short-term and long-term activities. Overall, these activities address content and issues broadly rather than in great depth. We also found

that the Consortia are constrained in their capacity to provide much follow-up support, although there are several important examples of Consortia using their support for professional development to leverage additional support for related activities.

- **Support for state teams and regional networks.** All the Consortia, like the regional educational laboratories in which they are located, engage in a variety of convening and network-building activities. Responding to ED's charge to work with state-level actors on their reform agendas, this category of activities and services involves the Consortia in a variety of relatively long-term relationships with state and multi-state groups. Support and assistance for the work of a variety of state and regional networks are prominent features in portfolios of seven of the Regional Consortia. In general, Consortia support includes paying for participation in team and network events, facilitating meetings and other activities, and staff support for projects. Some of these groups have generated products. In addition, the processes of coming together and developing the products also can form the basis for ongoing exchanges of ideas and collaborations. Finally, the groups can use Consortium resources to leverage other resources. At the early stage of the team and network operations when our fieldwork took place, however, a number of the teams and networks were, at best, searching for a set of tasks to undertake.

- **Task-specific assistance.** Consortia have assisted with substantive tasks in mathematics and science education (e.g., developing assessment items, implementing new instructional practices or content, implementing assessment systems, articulating standards and frameworks in mathematics and science education) and process tasks (e.g., planning and facilitating meetings, setting agendas, and planning for projects). Consortium reports and our interviews suggest that the primary focus is on process. In general, these services are directed primarily to state and regional groups and organizations, although some go to school districts or schools. Task-specific assistance to states includes, among other things, assistance to Eisenhower State Curriculum Frameworks Projects and SSI projects. For the Consortia, task-specific assistance has been an opportunity to showcase what the Consortia could do and their eagerness to do it. Up-front commitments of assistance and dollars that would be available over several years not only opened doors but helped to convey the idea that the Consortia were going to be around for a while. Finally, Consortium staff generally agree that relationships that involve them as partners help build a foundation for additional partnerships.

- **Dissemination.** Consortium dissemination efforts include the dissemination of a variety of materials, including newsletters and a small number of other Consortium-developed products. In addition, the Consortia have worked together to identify examples of promising practices in mathematics and science education and to disseminate information about these practices. Third, in partnership with the Eisenhower National Clearinghouse (ENC), the Consortia

operate technology demonstration sites. These sites, along with the development of a variety of electronic databases, represent significant new dimensions of the Consortia's capacities to serve the regions. Overall, dissemination represents a relatively modest investment of Consortium resources, although these efforts are a central part of the role Congress and ED envisioned for the Consortia.

- **Purchasing materials and equipment.** One of the ways that the Regional Consortia support school- and classroom-level efforts to improve mathematics and science education is to make Consortium funds available to purchase materials and equipment, including computer hardware and software, and accounts for access to the Internet. Consortium staff generally agree that the goal of making funds available for these purchases is to enhance educators' capacity to do their jobs. In the area of technology, they point to two benefits: dramatically increased access to information and ideas, and access to other people in the field. The limited data available thus far on how the materials and equipment purchased with Consortium resources are being used and what differences they have made lead to the preliminary observations that these improvements have resulted in payoffs for individual teachers, their students, and their schools. This is particularly true when there is help in using what is provided and when these investments leverage other investments. At the same time, the immediate benefits accrue to very small numbers of people in few places.

- **Networking among the Regional Consortia.** The development of a national network of the Regional Consortia with the ENC at the center was an important part of the original vision of the Regional Consortiums Program. Nevertheless, the idea did not receive much attention in the authorizing legislation or in ED's scope of work for the Consortia. The press of getting new organizations started, including establishing a role as organizational units within the regional laboratories, combined with delays in organizing the ENC, slowed progress on creating a network. Despite these impediments, Consortia directors began meeting and working together soon after the Consortia opened their doors. This collaboration has involved working with the ENC to identify and disseminate information about successful practice and to operate technology demonstration sites as well as other activities to enhance the efforts of individual Consortia to support mathematics and science education reforms in their regions.

The evolution of each type of activity, as well as the overall portfolios of the Consortia, reflect the demands of launching an assistance program. With a broad legislative charge and a mandate from ED to be useful to states, the Consortia have faced challenges in finding useful roles in the ongoing work of reform in mathematics and science education. It would be inappropriate to assess the effectiveness of all these start-up activities in terms of their effects on students and schools; some will be seen, in retrospect, simply as having offered entree for the Consortia into the more serious work of

reform. Thus, the activities described in this report provide no more than hints of the types of results that may be expected in later stages of the program's work.

In its early stages, the Regional Consortiums Program has sought to build a broad base of participation in planning and carrying out tasks intended to support reform (professional development, assistance, dissemination, and the like). Accordingly, there has been more emphasis on regional and intergovernmental process than on mathematics and science content, although content has not been absent from the program. It is not yet clear whether an emphasis on process will continue to be characteristic of this program or whether it represents a stage that the Consortia (and other reformers in their regions) will outgrow.

The future work of this evaluation includes assessing the contributions of Consortium activities to improvements in mathematics and science education. This will necessitate establishing clear, plausible links between at least some of the kinds of tasks described here and the program's ultimate mission of educational improvement. As the program matures, the empirical study of such links will become possible and desirable.

I INTRODUCTION

The Mathematics and Science Education Regional Consortiums Program was originally authorized under the Dwight D. Eisenhower Mathematics and Science Education Act (P.L. 101-297, Title II, Part A, Subpart 2).[1] In authorizing support for the Regional Consortia, Congress assigned them two broad functions:

- disseminating exemplary mathematics and science education materials; and
- providing technical assistance for the implementation of teaching methods and assessment tools for use by elementary school students, teachers, and administrators (Section 2016).

This report provides a description of the Regional Consortia's early operations as a first step in a study that will later offer more evaluative judgments. The overall purpose of the evaluation of the Eisenhower Regional Mathematics and Science Education Consortiums Program is to assess the contributions of the Regional Consortia as components of a federal strategy to support reforms in mathematics and science education. In this first round of the evaluation of the Regional Consortiums Program, we investigated the federal formulation of the program's purpose, the early organization of the Consortia, and the work of the Consortia. This report, which is primarily descriptive, discusses each of these topics in turn.

Like other new programs with a broad charge, this program has not marched in lockstep toward a clear destination. Instead, it has encompassed a variety of early directions, which this report attempts to sort out analytically. For example, the initial visions of this program put forward by Congress (in the authorizing statute) and the Administration (in a *Federal Register* announcement) were not identical. Then, as the Consortia began offering services in their regions, each developed its own array of initiatives and attempted to find its own niches. Under the circumstances, the first job of this evaluation has been simply to map what the Consortia are doing within a reasonably simple and uniform analytic framework of six categories—a framework created by and for this evaluation. With this framework established, subsequent phases of the evaluation will

[1] The Mathematics and Science Education Regional Consortiums Program has been reauthorized under Title XIII, Part C of the Elementary and Secondary Education Act of 1965 as reauthorized by the Improving America's Schools Act of 1994. The interim evaluation report focuses on activities supported under the original program authorization.

move several steps further and will assess the effectiveness and impact of the Consortia's activities and services.

Data collection for the initial phase of the evaluation included:

- Two-day visits to each of the Consortia by a member of the evaluation team. The agendas for these visits included interviews with Consortium directors and staff and managers and with staff of the regional educational laboratories that are the Consortia's host organizations. The visits also provided opportunities to tour the Consortia's facilities and, in several cases, to see their newly opened technology demonstration sites. Under the schedule prescribed for the evaluation, site visits were completed in late summer and early fall of 1994.

- Interviews with U. S. Department of Education (ED) staff and former ED staff who have worked with the Regional Consortiums Program and who are familiar with its evolution.

- Interviews with other Washington, DC-based individuals who are familiar with the early discussions and planning of the Regional Consortiums Program and who have continued to be associated with the program in different ways.

- Interviews with staff in state departments of education, including directors of state Eisenhower programs and National Diffusion Network (NDN) State Facilitators, directors and staff of State Curriculum Frameworks Projects, and other state systemic reform initiatives who are familiar with the development of the Regional Consortia and their portfolios of activities and services.

- Review of Consortium documents, including proposals and refunding requests, progress reports, newsletters and other publications, contents of electronic databases and networks, and early evaluation reports.

In addition, we were able to coordinate this evaluation with the fieldwork of the team evaluating the Statewide Systemic Initiative (SSI) of the National Science Foundation (NSF). During the past year, data collection for the SSI evaluation has included queries about the role and contributions of the Regional Consortia to several states' SSI projects.

II THE HISTORY OF THE EISENHOWER REGIONAL MATHEMATICS AND SCIENCE EDUCATION CONSORTIUMS PROGRAM

The federal vision of the role of the Regional Consortia was broad and technically challenging. This vision was articulated first by Congress in legislation and then, in different terms, by ED in a solicitation for proposals. The earlier congressional vision focused on the provision of support and assistance to teachers and other school personnel. The ED vision was different in one key respect: it emphasized the role of Consortia in supporting states in standards-based systemic reform. Here, we outline the evolution of the vision and then underscore the challenges that such a vision created for the Consortia.

Congress' Vision of the Eisenhower Regional Consortiums Program

The original vision of the Eisenhower Regional Consortiums Program began to emerge in the mid-1980s. At that time, Senator Mark Hatfield, the principal author of the authorizing legislation, expressed the concern that mathematics and science education was suffering from a lack of leadership and from a paucity of information about successful practices. According to a congressional staff member familiar with the initial discussions about the Regional Consortiums Program: "What we learned was that there was a lot going on, but we couldn't find a single person who had a good overview." Further, Sen. Hatfield was concerned that mathematics and science education reform initiatives were not taking advantage of many potentially valuable resources, and he was concerned about the apparent absence of broad-based community support for reform efforts. Another person familiar with these discussions said:

> "Sen. Hatfield felt that the data were clear about the problem. There were a lot of good materials and other resources that were not being used. There were also a lot of resources [in the field of] informal education [in mathematics and science] that were not being used."

To address these problems, Sen. Hatfield and others in Congress called for the development of regional entities that would assist teachers, school districts, and communities in identifying resources to support reform in mathematics and science education and would also work to bring these disparate groups together. As a person familiar with these discussions explained it:

> "What was necessary was a broad-based conversation about what was needed in mathematics and science reform from the bottom up. The Mathematics and Science Consortia were really to engage [local] educators

in the conversations about change and to provide materials and information to help them."

These local efforts were to be supported at the national level by a clearinghouse that would assemble and disseminate information about successful practices. An important theme in these discussions, according to several people we interviewed, was that the Consortia, working in collaboration with the national clearinghouse, would represent a new strategy for providing technical assistance. In particular, there was an expectation that the Consortia would be organized as a national network. "We didn't want a [group] of individual, unconnected centers. We wanted a national network.... The clearinghouse was to be the center, and the Consortia were to be on the front line." A regional educational laboratory manager who is also familiar with the discussions described two additional elements of the vision of a new approach to technical assistance:

> "There was a dramatic need to accumulate all of the material [on mathematics and science education] and to make it accessible. ... But if it's only a repository, you get another ERIC. There would need to be a two-phased design for the Consortia. First, they would use modern technology to access collections in other places.... Look at ERIC. The people who use it are researchers, not teachers. [This observation] led to a plan for regional centers that would perform an outreach function. ... These regional centers would be expected to have ideas about assistance strategies and how to make things happen."

The statute authorizing the Regional Consortiums Program elaborated on these functions by including 16 specific tasks for the Consortia to carry out (Section 2017):

- Identify, adapt, disseminate, and implement mathematics and science education instruction materials, teaching methods, and assessment tools for use by elementary and secondary school students.

- Assist, train, and provide technical assistance to classroom teachers, administrators, and other educators to identify, implement, or adapt the instructional materials, teaching methods, and assessment tools described [above].

- Provide for the training of classroom teachers to enable such teachers to instruct other teachers, administrators, and educators in the use of the instructional materials, teaching methods, and assessment tools described [above] in the classroom.

- Work with classroom teachers in the identification and adaptation of such instructional materials, teaching methods, and assessment tools for use in classrooms within the region.

- Assist classroom teachers, where appropriate, in securing training to enhance such teacher subject knowledge and teaching skills in the areas of science and mathematics education.

- When necessary, provide financial assistance to enable teachers and other educators to attend and participate in the activities of the Regional Consortium.

- Implement programs and activities designed to meet the needs of groups that are underrepresented in, and underserved, by mathematics and science education.

- Help state and local education agencies or Consortia thereof assess the need for and the desirability of regional mathematics and science academies.

- Develop and disseminate early childhood education mathematics and science instructional materials.

- Develop intergenerational projects to train senior citizen volunteers in the implementation of interactive science processes and activities for use by elementary and secondary school students.

- Disseminate information regarding informal mathematics and science education activities and programs offered by federal agencies and private or public agencies and institutions within the region.

- Provide technical assistance in order to maximize the effectiveness of such instructional materials and programs and fulfill the instructional goals of the recipients of such materials and programs.

- Collect data on activities assisted under this subpart in order to evaluate the effectiveness of the activities of the Regional Consortia.

- If feasible, maintain on-line computer networks with all regional consortiums and the National Clearinghouse for Science and Mathematics Education Materials.

- Assist local and state educators in identifying science equipment needs.

- Coordinate activities carried out by the Regional Consortium with activities carried out by the...regional educational laboratory [in the region].

Two things stand out in Congress' expectations for the Regional Consortia. First, the Consortia were assigned a very ambitious role, including product and program development, training, dissemination, and technical assistance. Their work was to span

mathematics and science content, instruction, and assessment. They were to work in early childhood education, elementary and secondary education, and informal education, and to help bring senior citizens into the enterprise.

A good example of this ambitiousness is found in the charge to train and assist classroom teachers and others in identifying, implementing, or adapting new materials, instructional strategies, and assessments in their classrooms and schools. This could require, for example, long-term, sustained assistance to help teachers equip their students to communicate mathematically—helping teachers learn instructional practices that concentrate on mathematical reasoning and require students to reflect on and write about what they are doing. Or it could mean working with teachers and administrators to look at the advantages and disadvantages of performance-based assessments in assessing student learning and reporting results to parents and school boards. Alternatively, providing this kind of assistance to educators could mean that the Consortia would need to collaborate with other assistance providers to ensure necessary follow up and long-term support. In any case, whether through direct assistance to local educators or through the establishment and maintenance of collaborative relationships, fulfilling this charge would be no small task.

Looking back at this list of activities in light of the actions subsequently undertaken by the Consortia with guidance from ED, the second striking feature in the statutory language is the absence of explicit directions to work with states and state reform initiatives. The law does not preclude the Consortia's working with states, but it concentrates explicitly on an ambitious agenda of assistance and marshaling resources at the local level.

Negotiating their way through the intergovernmental system to establish effective working relationships has been time-consuming work for the Consortia, as it inevitably is for all would-be providers of technical assistance in education. The Eisenhower statute has not helped much in this regard; it does not spell out what working relationships, if any, Congress expected among the overlapping national, state, and local reform activities it authorized in mathematics and science. Subpart 1 of the statute ("State Grants and National Programs", Sec. 2006), authorizes the use of Eisenhower funds by states and school districts for professional development for mathematics and science education teachers, training in technology, "integrating higher order analytic skills into the mathematics and science curriculum," and dissemination of information about exemplary programs. The parallels to the Consortia's responsibilities present both opportunities and

problems for the reform process, setting up a situation in which there would be multiple initiatives from all levels and, no doubt, some squabbles over turf. As a participant in some of the early discussions about the Regional Consortiums Program explained it:

> "Congress has conceived of a variety of ways to support mathematics and science education. All of them are good ideas. The Consortia are one part of the support. The design error was that no one had thought through how the programs would fit together at the local level. There were different sets of players who were being given credibility, and that was confusing."

The law does not discuss a national network other than by mentioning the possibility of computer networks connecting the Regional Consortia to each other and to the national clearinghouse. However, as the comments of the congressional staff member quoted above indicate, there was an expectation that the individual Consortia would coalesce into a national network. "We thought the idea of a network was implied. We put money in for a network."

The law required the Secretary to fund at least one Consortium in each of the 10 geographic regions served by ED's regional educational laboratories. Awards were to be competitive within each region. Although a variety of public and private nonprofit organizations were eligible to apply for grants, the statutory definition of the Consortia's service regions as those of the regional educational laboratories gave the laboratories a clear advantage over other potential competitors. This advantage derived from the fact that the laboratories were the only entities that had well-developed networks and working relationships throughout these specific groups of states and other entities. A person who participated in a number of the discussions regarding the development of the program suggested that this provision in the legislation may have helped set the stage for opposition to the Consortia by "creating the image that the Regional Consortiums Program was an entitlement for the regional laboratories."

The Congressional vision of the Regional Consortiums Program, then, set the stage for a protracted period of honing the program's mission and its working relationships in the field. In particular, the following features of the statute were to have repercussions for the program's early years:

- A broad and ambitious charge to effect the kinds of changes in schools that take years of sustained professional effort.

- No clearly articulated charge to work with states or with each other in the accomplishment of this mission.

- An implicit advantage for one set of organizations, the regional educational laboratories, as contenders for program funding.

ED's Vision of the Eisenhower Regional Consortiums Program

In June 1992, ED issued a *Federal Register* notice inviting applications to develop and operate Regional Consortia. The solicitation began by echoing Congress' overall vision for the Regional Consortiums Program. However, in setting an "absolute priority" for funding, the solicitation refocused the vision for the Regional Consortia in two important ways. First, ED set a priority for funding proposals that sought funding for "the development and operation of Regional Consortia to support systemic reform." The notice did not define systemic reform, but it said the means of accomplishing it would be by disseminating exemplary materials and methods for teaching and assessment and by providing technical assistance in their use. Second, in specifying tasks, ED listed assistance to states as the first of seven required activities. Under the scope of work, Consortia were required to:

- Provide technical assistance to help states adopt world-class standards in mathematics and science, develop curriculum frameworks that embody these standards, and develop new forms of assessment matched to the curriculum frameworks. The Consortia must also provide technical assistance to help states develop and implement new approaches to teacher inservice and preservice education and teacher certification appropriate to the standards and frameworks.

- Identify and disseminate exemplary mathematics and science education instructional materials, teaching methods, and assessment tools for use by elementary and secondary school students.

- Train and provide technical assistance to classroom teachers, administrators, and other educators to adapt and use the exemplary materials.

- Provide funds, if necessary, to support the assistance of teachers, administrators, and other educators in designing Consortium activities, and, subsequently, their participation in these activities.

- Maintain on-line computer communications with all Regional Consortia and the Eisenhower National Clearinghouse.

- Document and report on Consortium development and implementation processes.

- Establish broadly based regional advisory boards to oversee the administration and establishment of priorities for the Consortia.

To a greater degree than the authorizing statute, this notice spelled out some avenues for working relationships between the Consortia and related federally funded initiatives. The solicitation communicated in several ways that a good point of entry for Consortium activities and services would be the major federally supported mathematics and science education reform initiatives—Eisenhower State Curriculum Frameworks projects and NSF's Statewide Systemic Initiatives (SSI) projects. For example, in identifying exemplary practices, the Consortia were required to consult with Eisenhower state coordinators, NDN State Facilitators and the National Science Foundation's State Systemic Initiatives projects (in addition to classroom teachers, state science and mathematics supervisors, and other organizations promoting reform). Similarly, the Consortia were required to coordinate the design and implementation of their professional development programs in mathematics and science with those of other federal or state programs. Finally, the solicitation suggested representatives from SSI projects as good candidates for membership on the Consortia's advisory boards.

In a later document (not dated, but titled "Program Narrative [continuation applications]"), ED further underscored its expectation that the Consortia would focus their attention on standards-based systemic reform in which the states would be key actors. In summarizing their previous activities, the first thing that the Consortia were required to do was to describe the technical assistance provided to each state on the following: (1) adopting standards; (2) developing curriculum frameworks tied to the standards; (3) developing and using assessments tied to the standards; and (4) new approaches to teacher education and certification appropriate to the standards.

In summary, the ED vision of Regional Consortia, as formally conveyed in the *Federal Register* notice and the subsequent request for program narratives, articulated some subtle but important shifts in direction from the original statutory vision:

- The Consortia would take standards-based, systemic reform as their guiding theme.
- Working at the state level would be a cornerstone of their operations.
- They would consult in certain prescribed ways with grantees under other federally funded reform initiatives.

Interorganizational Challenges Facing the Regional Consortia

The Regional Consortia, then, faced significant challenges as they began the proposal and planning process. First, and perhaps most important, they were asked to fulfill an ambitious agenda ranging from giving direct assistance to classroom teachers to supporting states in systemically reforming their entire educational systems. Indeed, many of the specific tasks they were asked to take on—implementing new approaches to preservice education, for example—posed technical and political problems that many of the nation's best minds and institutions have been struggling with for decades (see, for example, Goodlad, 1990). Second, among the key targets of their assistance were state-level entities with established norms, political agendas, and technical capacities. Finally, by focusing on standards-based reforms, the Consortia were entering an already crowded reform arena. By some accounts, more than 45 states were already involved in some form of standards-based reform by 1994 (Fuhrman, 1994). Moreover, the federal government, through NSF's Statewide Systemic Initiatives and Teacher Collaboratives programs and through ED's State Curriculum Frameworks Projects program, was supporting similar reform efforts in some 30 states. While at first glance it might seem that this overlap presented the Consortia with a rich field of opportunities to be helpful, the realities of interorganizational politics meant that there were also many possibilities for conflict over missions and turf.

The Consortia were asked to take on a series of difficult tasks while forging relationships with the key players—state-level reformers—who had already begun similar reform efforts. The state reformers, most but not all of whom were employees of state education agencies, had varied reactions to the Consortia. Some welcomed the offer of additional assistance and the promise of new resources. Others simply wanted to ignore the Consortia, not understanding how such recently organized institutions could help a state team already in the midst of a reform effort. Still other state-level actors opposed the Consortia, seeing them as unfair competitors for a finite pool of resources.

This variety of reactions came into clear focus for many observers of the Regional Consortiums Program at a event in 1992. A few months after awarding grants to the Regional Consortia, ED convened a "megameeting" to bring together people who were working on mathematics and science education reform as part of the State Curriculum Frameworks Projects, the SSI projects, and the Regional Consortia. The purpose of this meeting was to encourage the development of a national reform network in mathematics and science education and, in part, to showcase the recently funded Consortia.

This meeting was important to development of the Regional Consortiums Program for several reasons. First, it did provide national visibility for the fledgling organizations. Following meetings among themselves prior to the megameeting, Consortium directors met with representatives from states in their regions and shared their perspectives and plans on how the Consortia could contribute to reform in mathematics and science education. Several Consortium directors commented on the value of these meetings with state representatives. Another suggested that the meeting helped to "galvanize the initial momentum" for Consortium activities and services.

Ironically, the meeting was also important because it was an occasion when some of the concerns about the Consortia surfaced at the national level. The Consortium directors and staff and several laboratory managers acknowledge the existence of these early concerns, although they see them as the exception more than the rule. As one Consortium director explained it: "While some Consortia admittedly had strong challenges...most did not. Moreover, learning from one another (about strategies) to mitigate challenges and move quickly with mid-course corrections (should) be perceived as responsibly addressing the intent and purpose of the Regional Consortia." Most of the directors agreed with this assessment of the meeting. Further, most of them saw the resistance as temporary and not too difficult to overcome, perhaps reflecting their experience with other federal initiatives that have been less than welcome in their regions.

Other Consortium directors and staff noted that there was "some resentment to the new kid on the block getting funding." Several others spoke of the problems of arriving in the reform arena late: "We were new and we were late. Everybody knew the lab, but nobody knew the Consortium, and they already had their own initiatives under way." "The Consortia were seen as another federal initiative laid on things that were already under way."

In contrast to the Consortium directors' views, the Washington-based people we interviewed saw strong opposition to the Consortia and characterized the meeting as "a substantial attack on the Consortia," and a "tremendous public relations problem." Another told us that, at the meeting, a number of state mathematics and science program managers expressed "their anger at not having been able to control the funds spent on the Consortia." Several respondents characterized this view as people "thinking that the Consortia had stolen money from them." An OERI staff member who heard from a number of states at the megameeting put the issue succinctly: "The states were saying to the Consortia, 'Why don't you give us all of your money and just go away?'"

In the end, each of the Consortia—as well as the ED staff—had to deal with a variety of state reactions to a large amount of federal dollars being awarded to support new regional initiatives:

- Some welcomed the promise of help.
- Some took a wait-and-see attitude.
- Some did not hesitate to express opposition, charging that they themselves would have been more deserving recipients of the program dollars.

As field-based organizations, the Consortia were shaped by the interplay between these initial responses and their own coping strategies. Importantly, the degree to which preexisting resistance and opposition grew or weakened depended in part on the way the Consortia presented themselves to their regions, both in the process of planning and in the early delivery of services. As we discuss in the next section, planning strategies employed by some of the Consortia were effective at building support and defusing potential resistance within in their regions. In addition, some Consortium directors say that the way that they have organized their advisory boards helped them avoid some early difficulties and balance competing demands for Consortium resources. Finally, as we suggest in our discussion of Consortium activities and services in Section IV, a number of early activities represented largely successful efforts to increase the Consortium visibility and establish credibility as contributing partners in mathematics and science reform.

III ORGANIZING THE REGIONAL CONSORTIA

In October 1992, the U.S. Department of Education funded 10 Regional Mathematics and Science Education Consortia (see Exhibit 1). Nine of the grants went to laboratories, and the tenth went to the College Board with a regional laboratory as a subcontractor. Funding for individual Consortia in fiscal year 1993 ranged from a low of $998,401 to a high of $1,500,899, with most of the Consortia receiving between $1.1 million and $1.2 million.

In this section, we look at three tasks in the initial organization and development of the Regional Consortia—planning, staffing, and establishing regional advisory boards—as well as at the capacities of the regional laboratories as host organizations. Our focus is on the strengths and weaknesses that were perceived by the Consortia themselves and other observers in these start-up tasks and initial capacities. Although different patterns of strengths and weaknesses could certainly evolve over time, these initial observations do provide clues that we intend to pursue in our forthcoming investigation of the Consortia's actual accomplishments.

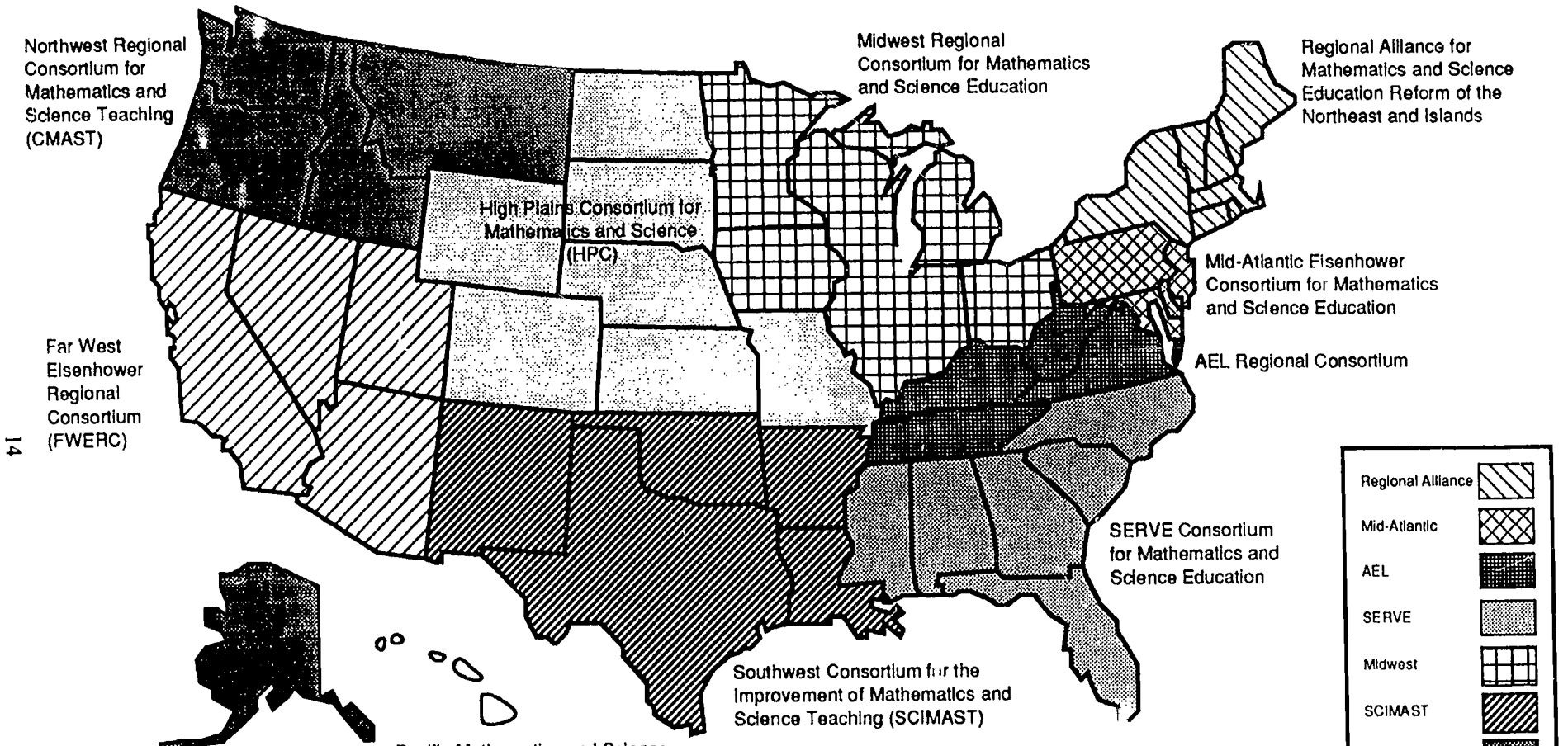
Planning the Regional Consortia

The process of putting proposals together gave the Consortia an opportunity to do some planning with their regions, albeit in a brief window of time and under the constraints of the specifications already in the law and ED's priorities. In May 1992, the Secretary published the notice of proposed priorities for the Regional Mathematics and Science Education Consortiums Program. Application packages were available June 26, and proposals were due July 31. The formal solicitation process thus included relatively little time for planning and especially for applicants to garner input and support from stakeholders. However, because potential bidders were aware of ED plans before the solicitation was issued, there was, in fact, more than a month available for preparing proposals.

In the view of many Consortium managers, the range of choices available for planners and advisors was limited in any case. A theme that runs through our interviews with a number of Consortium directors and laboratory managers is that the requirements for Consortium activities and services were so prescriptive that there was very little room for flexibility in Consortium design. As one put it: "The RFP succinctly spelled out the

Exhibit 1

Eisenhower Mathematics and Science Education Regional Consortia



The Regional Alliance for Mathematics and Science Education Reform of the Northeast and Islands also serves Puerto Rico and the Virgin Islands. The Pacific Mathematics and Science Regional Consortium serves American Samoa, Commonwealth of the Northern Mariana Islands, Federated States of Micronesia, Guam, Hawaii, Republic of the Marshall Islands, Republic of Palau.

patterns for service delivery, thereby largely designing [the Consortium] before the proposal development process began."

Consortium directors and laboratory managers in two regions did, nevertheless, convene regional groups to play active roles in developing their proposals. A manager at the Appalachia Educational Laboratory (AEL), the home of the Eisenhower Regional Math/Science Consortium at AEL, explained the laboratory's perspective on this task as follows:

> "Part of the lab's role is convening people in different role groups to identify needs and to network among job-alike people. As part of this, we sometimes brought together math and science people to talk—math/science consultants, SSI people, and a professor...who had developed activities manuals for K-12 that reflected the NCTM standards. The lab did a needs assessment with these state people and used it as the basis for responding to other work. We used the needs assessment to inform the proposal writing."

This manager went on to explain that one of the key roles of the core planning group was to build early support for the Consortium in the region.

Another relatively participatory planning process took place for the Southwest Consortium for the Improvement of Mathematics and Science Teaching (SCIMAST) at the Southwest Educational Development Laboratory (SEDL). Preparation of SEDL's proposal included convening a group of about 40 mathematics and science education leaders from the region to determine what the Consortium should do. According to the Consortium director, the principal theme of this meeting was that there is a need for good professional development, and the result was a proposal that focused on professional development as the central task of the Consortium. Once the Consortium was formed, most members of its advisory group were drawn from the planning group. One board member recalled the proposal development process as follows: "They heavily involved us. We looked at the plan and goals and targets that SEDL was moving toward. They came up with proposals; we reviewed them and offered feedback. We had the authority to make any changes that would strengthen it." Another reported that the group "had a major role in terms of suggesting and reviewing the proposal. Committees brainstormed about the direction SEDL wanted to take the project. From the grass roots, the advisory group gave direction to the project."

Directors of these two Consortia say that these planning processes helped create a sense of ownership of the Consortia and helped develop a regional perspective on Consortium activities and services that, in turn, helped defuse competition among the states for Consortium resources.

Other Consortia also describe planning processes that reflected interactions with the field. For example, staff at the Northwest Educational Laboratory began working on plans for what became the Northwest Consortium for Mathematics and Science Teaching (CMAST) well before the solicitation was issued. They felt that their preparation helped them understand the needs of the region and allowed them to develop a plan that met those needs, that was consistent with the goals of the laboratory, and that was responsive to the solicitation. The director of the Far West Eisenhower Regional Consortium (FWERC) reported that the design changed in response to states' views expressed during proposal development. The laboratory's original design focused on developing networks of science-rich organizations within the states. The states were not interested and said that what would be more helpful was assistance, including resources, specifically tailored to each state's needs and interests. The proposal for this Consortium was revised to reflect this approach.

In some regions, however, the process of bringing states into the planning process did not progress so smoothly. One observer who was actively involved in the earliest discussions about the program suggested that at least some of the Consortium directors created problems for themselves because they "thought that their job was to coordinate reforms in their region." He went on to suggest that "these Consortia simply misunderstood their role and did not recognize that they didn't have the clout or the resources to do these things."

Regardless of the particular personalities involved or the effort made by the Consortia to include state reformers in the planning process, the proposal-development process allowed for, at most, an initial foray into consultation with a region. Some Consortia report succeeding in launching consultation at this early stage, despite the following significant constraints:

- The short time available and what was seen as a relatively prescriptive RFP placed limits on planning and consultation.
- The critical participation of comparatively few stakeholders in shaping Consortium services because reform in mathematics and science education is, as

we have said, a crowded field. As a result, the early stages of Consortium operations had to include considerable work in building a customer base and working partnerships in the regions.

The Capacities of the Regional Educational Laboratories as Host Organizations

The regional educational laboratories brought a range of strengths and weaknesses to the Regional Consortiums Program. For example, prior experience and capacity in mathematics and science education varied among the laboratories. To be sure, all of the laboratories participated in a Laboratory Network Program mathematics and science initiative that began in 1988. In 1990, 5 of the 10 included plans for work in mathematics and science education in their proposals for the 5-year funding period ending in 1995. For 2 of these, SEDL and NWREL, these were new programs.

One area where the laboratories could point to a growing capacity was in the use of technology for dissemination and professional development. The most extensive laboratory technology initiative is at the North Central Regional Educational Laboratory (NCREL). There, laboratory staff have developed an interactive electronic database for use in local school improvement efforts. The laboratory, along with others, has also produced a number of videos for use in professional development programs. Another large technology project is SERVELine, an e-mail system with a large database of current information on educational practice and school improvement. Research for Better Schools has developed and pilot-tested four prototype databases for future mathematics and science descriptors. Several laboratories have explored the use of telecommunications in assisting rural schools.

The laboratories did bring considerable expertise and capacity in several other areas directly related to the work of the Consortia. They had been involved in a variety of school improvement projects, some spanning several funding cycles, representing substantial investments of laboratory resources and a strong commitment to helping school and district personnel. The laboratories also had substantial experience in professional development and training, although little of it was in mathematics and science.

In addition, laboratories have track records as conveners and facilitators. Through the years, they have brought together both disparate and homogeneous regional groups to discuss topics and issues in education. As conveners and facilitators, laboratories have a reputation for bringing an unbiased, research-based perspective to critical and often controversial issues.

Another factor that can contribute to the capacity of a regional educational laboratory as an organizational home for a regional Consortium is the support of the laboratory's governing board. Uniquely among ED contractors, laboratories are required to have regionally based boards, including chief state school officers and other leaders in education and other fields, that exercise direct authority over the program of work, including hiring and firing authority over laboratory executive directors. We saw several examples in which a laboratory's governing board played a significant role in supporting a Consortium. SEDL's board added a new goal to the five initially set for the laboratory's contract with OERI, supporting the development of a mathematics and science initiative in the laboratory and thus setting mathematics and science education as priority areas for laboratory work. NWREL's board has established eight goals for the laboratory, and a board committee, which serves as the Consortium's advisory board, worked with the Consortium to identify aims for the Consortium that correspond with the laboratory's goals.

Thus, although the laboratories were generally not major players in the arena of mathematics and science education reform, they brought some significant capacities to the Regional Consortiums Program:

- A rapidly growing capacity in the development and application of high-technology systems for professional development and assistance.
- Skill in convening regional groups, even around controversial topics.
- Powerful governing boards whose members occupy positions of authority in the regions.

Staffing the Regional Consortia

Given the Consortia's broad scope of responsibilities, assembling an appropriate staff is a real challenge. We found considerable variation in staff size and how individual staff are organized. In addition, the Consortia varied in how quickly they were able to assemble their staffs, with a few moving very quickly and the others not doing so. Overall, Consortium staff must balance demands for assistance in both mathematics and science education and for providing help and direction in a changing reform arena.

The Consortium staffs range in size from three full-time-equivalent (FTE) professionals to nine FTEs. In some Consortia, including the AFL Consortium and the High Plains Consortium at the Mid-Continent Regional Educational Laboratory (McREL)

there are small core professional staffs (three and four people, respectively) who are assigned to the Consortium full time. In other Consortia, professional staff are assigned to the Consortium for only a portion of their time and have other assignments elsewhere in the organization, often in the Laboratory Network Program. For example, at the time of our fieldwork, the staff at the Regional Alliance for Mathematics and Science Education Reform (Regional Alliance) comprised 19 professionals and 8 support staff. One co-director is assigned to the Consortium full time, and the other is assigned for 80 percent. All of the other professional staff devote 50 percent or less of their time to the Consortium, and eight devote 25 percent or less of their time. Four Consortia define at least some of their staff roles in terms of working with individual states. For example, CMAST, FWERC, and Mid-Atlantic try to assign individual staff members to focus on one state. Staff from the South Eastern Regional Vision for Education (SERVE) Consortium are assigned to satellite offices in several states in the region.

Most of the professional staff have backgrounds in mathematics or science education or technology, and many come from state departments of education or school districts. Two Consortia have hired dissemination specialists. Consortium evaluators are often drawn from the ranks of laboratory evaluators, under a formal contractual relationship between the Consortium and the laboratory. Several Consortia rely on consultants to help them carry out their activities, particularly in conducting workshops and other training events. For example, the AEL Consortium employs award-winning mathematics and science teachers to conduct workshops around the Appalachia region.

Several Consortia were able to recruit a full complement of staff within the first few months of operation; however, most Consortia did not have their full staffs in place until near the end of the first year of operation, and some did not fill all of the staff positions until well into the second year. In addition, four Consortia have experienced changes in directors since they began operations; two have experienced several changes. The pace of hiring staff meant that it was difficult, if not impossible, for at least some of the Consortia to offer a broad range of services when they first opened their doors.

Consortium staff members believe that their credibility and utility depend in part on their content expertise as mathematics and science educators. For example, in a Consortium in which staff experience is balanced in favor of science, several staff members told us that they "feel comfortable with K-5 math but are uncomfortable with secondary math" and that it is sometimes difficult to answer questions about mathematics. "I can focus on effective teaching strategies, but I can't really apply algebra to the real world. I

can find the information, though." A member of the staff in another Consortium added the following observation: "One of the things that I have thought about a lot is the credibility of the staff. State department people are math and science experts. They want to know if the Consortium staff have the expertise to help them—to help them take the next step." Reflecting on the same issue, the director of a State Curriculum Frameworks Project in another region offered the following explanation for why he and his staff do not work with the Consortium that serves their state: "When I look at what [a Consortium staff member] knows and what I know about science education, I ask myself, 'What can they do for me?' My answer: 'Not very much.'"

Subject-matter expertise is not the only criterion for Consortium staff quality, however. Overall, based on our interviews with state department officials and others who are familiar with the Consortia, most Consortium staff members, including those referred to here, enjoy very good reputations in their service regions. They are recognized as being responsive to requests for help, good facilitators, and knowledgeable about professional development. These Consortium staff also possess expertise in mathematics and science education. Nevertheless, the comments quoted above illustrate a challenge for the Consortia that goes beyond mathematics and science expertise: that of building a track record in significantly advancing systemic reform. Helping state staff "take the next step" in reform is indeed difficult, as is leading a cutting-edge discussion of implementing curriculum frameworks. There is a limited body of knowledge and experience in systemic reform on which to build expertise, let alone to help others with the task.

In summary, our evidence from the Consortia themselves and those customers whom we interviewed supports the following generalizations about staffing:

- The variation in Consortium staffing arrangements encompasses either a small number of staff who spend full time on Consortium work or a larger number who split their time across programs.
- Most Consortia took a year or even longer to assemble their full staffs.
- Three domains of expertise are considered important by the Consortia themselves and those whom they assist: content expertise in mathematics and science education; process expertise in clarifying and responding to regional needs; and expertise in advancing systemic reform.

Our data so far are not complete or recent enough to support overall ratings of the Consortia's staff capabilities.

Regional Advisory Boards

The Consortia are required to establish regional advisory boards that represent the mathematics and science education communities. In contrast to the regional laboratories' boards of directors, which have actual governance responsibilities, the Consortia's boards are advisory only and are charged with overseeing "the administration and establishment of program priorities" for the Regional Consortia. As with the laboratory governing boards, the Consortium advisory boards can and do serve a variety of functions for the Consortia.

All the Consortium advisory boards comprise representatives from each entity in the service regions and generally reflect the interests of the mathematics and science education communities. Membership on individual advisory boards varies, although there are some common patterns. For example, advisory boards typically include representatives from state mathematics and science education professional associations, directors of SSI projects, Eisenhower state program staff, NDN state facilitators, and other state department officials. Advisory boards also include representatives from institutions of higher education and the business community. Boards vary in how members are selected, however, with implications for their role and contributions to the Consortia.

One way of organizing an advisory board is to draw at least some of the members from the host laboratory's governing board. Three Consortia illustrate different arrangements for overlapping memberships. The CMAST advisory board is a subcommittee of the board of the NWREL board. Membership on the subcommittee includes members of the laboratory's board and representatives from the mathematics and science education communities. At the Pacific Consortium and at the FWERC, the laboratory governing boards serve as the advisory board for the Consortium. These arrangements can help put the Consortium more squarely into the mainstream of the laboratory's work. For example, Far West Regional Consortium advisory board members—who, when wearing their laboratory governing board hats, had helped set laboratory goals—guided the Consortium in setting goals that were consistent with the laboratory's goals. A potential disadvantage of drawing advisory board members entirely from the laboratory's governing board is that the perspectives and experiences of the mathematics and science education community may be underrepresented in advisory board discussions.

A second strategy for organizing the advisory board is to select members from state teams convened by the Consortium. The advisory groups of the Mid-Atlantic Consortium and the Regional Alliance are examples of this configuration. Selection takes place through a combination of nominations by the state teams and choices by the Consortia. In a variation on this pattern, the AEL Consortium has four state steering committees with members drawn from a wide range of stakeholder groups. The Consortium drew its advisory board members from these teams. In all of these cases, Consortium staff report that relying on state team members for board membership ensures that state and local interests will be well reflected in the decisions of the board. At the same time, they must work hard to ensure that competition among the states for Consortium resources does not impede board decision-making about regional services.

A third strategy is for Consortium staff to select representatives from across their region to serve on the advisory board. Typically, they select approximately equal numbers of representatives from each state and entity and from a wide range of role groups. A manager at SCIMAST asserts that selecting a regional board, as opposed to a board made up of representatives of state groups, encourages the board to have a regional focus and to avoid competition among the states for Consortium resources.

Under the terms of their grants, the Consortia are not permitted to use Consortium funds to support the participation of members of the advisory board in board activities. Because this restriction limits the number of times that the Consortia can meet with their advisory boards, the Consortia tend to schedule board meetings in conjunction with other events, including laboratory board meetings. In addition, several of the Consortia report extensive use of conference calls and e-mail to communicate with their boards. These arrangements are effective ways of getting around the restrictions on using Consortium funds to pay for board participation. It is possible that they are less effective than meetings as strategies for focusing the boards' full attention on Consortium affairs.

Consortium staff report that the Consortium advisory boards are important sources of information about current developments in the regions and about opportunities and needs for Consortium services. In addition, advisory boards of several Consortia review state requests for Consortium assistance and advise the Consortia on decisions about allocations. At SCIMAST, the advisory board is charged with the responsibility for making final decisions about awards and continuation support available through the Consortium's minigrant program. At another Consortium, staff and the board spent considerable time reviewing a major shift of priorities from supporting assistance to

individual states to taking a more explicitly regional perspective in activities and services. Even though these boards operate only in an advisory capacity, they can make two important contributions to the work of the Consortia. First, they represent a potentially broad base of planning and decision-making and for linking the Consortia to other reform initiatives and programs. Second, to the extent that the advisory boards' input is reflected explicitly in Consortium activities and services, the various groups in the mathematics and science education communities that are represented on the boards may assume a sense of partnership, possibly even ownership, in the Consortia's work.

In summary, boards have these characteristics:

- Those composed of members of the laboratory governing board are said to help embed the Consortium in the mainstream of laboratory work, while possibly lacking specific content expertise in mathematics and science education.
- Those representing state teams can effectively bring state interests to the table, with the risk that an overall regional perspective may be lacking.
- Boards are key sources of intelligence about opportunities and needs for Consortia's work in relation to other developments in the regions.
- Boards composed of people selected across the region who are not representatives of state interests can bring a regional perspective to the board's advice and guidance.
- To the extent that they become active partners in Consortium decisions, board members strengthen the Consortium's ties to the organizations that they represent, thus solidifying its field-based presence.

IV THE ACTIVITIES AND SERVICES OF THE REGIONAL CONSORTIA

The Consortia have embarked on a broad range of activities and services and have made substantial progress in forging relationships with the mathematics and science education reform communities in their regions. At the time of our fieldwork, few, if any, of these activities were mature. Indeed, some had been initiated only a few months earlier. Given the tasks of creating new organizations and building effective working relationships with new partners in a complex reform arena, this finding comes as no surprise.

We identified six broad categories of Consortium activities and services:

- **Professional development**—provided to teachers and administrators, often drawing them into a relatively long-term relationship with a Consortium
- **Support for state teams and regional networks**—usually a long-term proposition, reflecting the degree of purposefulness that the team or network attains
- **Task-specific assistance**—a variety of activities intended to help with tasks such as writing a proposal, planning a meeting, or conducting an evaluation; the recipients of this help are often state-level actors in reform initiatives such as the SSI and Eisenhower curriculum frameworks projects
- **Dissemination**—the distribution of print materials and, increasingly, the use of communications technology to transmit information and ideas and to facilitate interaction among education professionals and policy makers at the local, state, regional, and national levels
- **Purchasing materials and equipment**—usually involves the direct allocation of Consortium funds to schools or classrooms, often with the requirement of a local match as a way of increasing the impact of Consortium resources as levers for other resources
- **Networking among the Regional Consortia**—from the beginning, the Consortia have met and worked together as a network. This has involved working with the Eisenhower National Clearinghouse (ENC) to identify and disseminate information about successful practice as well as other activities intended to enhance the efforts of individual Consortia to support mathematics and science education reforms in their regions.

Our discussion of Consortium activities and services includes examples of a variety of things that the Consortia are doing. We have chosen these examples because they

illustrate not only the work that is being done but also what are, in our judgment, key issues related to the organization and operation of the Consortia.

Professional Development

Across the Regional Consortia, there is a strong commitment to professional development for teachers and other educators who are engaged in improving mathematics and science education. Although we do not have complete data on the actual investments in professional development, documents from the Consortia as well as our interviews with Consortium managers and staff indicate that these investments account for a substantial portion of the Consortia's annual budgets. The Consortia support professional development in two general ways. First, they pay for professional development conducted by third-party providers and/or for teachers and other educators to participate in professional development. Second, the Consortia conduct the professional development themselves. Consortia-supported professional development includes both short-term and long-term activities. Overall, we found that these activities address content and issues broadly rather than in great depth. We also found that the Consortia are constrained in the their capacity to provide much follow-up support, although there we did see several important examples of Consortia using their support for professional development to leverage additional support for related activities.

With respect to content, much of the training combines a focus on mathematics and science content with attention to instructional strategies and assessment. Thus, workshop topics may include alternative assessment in mathematics and science, integrating mathematics and science teaching and learning, or the use of manipulatives in mathematics instruction, to name a few. Other professional development covers generic classroom practice but may include little mathematics and science content. Consortia's descriptions of their professional development services also indicate that equity is an important theme in these activities. Content may include attention to instructional practices and curricula for disadvantaged students or students from various ethnic groups. Professional development may also focus on strategies and policies for increasing the access of disadvantaged and minority populations to mathematics and science education programs. Finally, professional development events, particularly one-time events, may be intended to call attention to national standards in mathematics and science, new performance-based assessments, the meaning of systemic reform, and the role of the Consortia themselves.

Providing Funds to Pay for Professional Development

As a way of helping to enhance the supply of professional development, Consortia often provide funds to states or organizations to produce conferences on issues in mathematics and science. Consortia may also help with planning and convening these events, whether or not they provide presentations or training at the conferences. Examples of Consortium assistance with conference funding and logistics include the following:

- Staff at the SERVE Consortium collaborated with a local professional development academy to develop a workshop in which a master teacher taught 12 students integrated mathematics and science while other teachers observed for 1 week. These teachers then taught lessons with assistance from the master teacher. The Consortium helped design the workshop and provided $50,000 to pay for salaries, instructional materials, and supplies.

- SERVE Consortium staff also assisted with the National Algebra Conference in Mississippi, attended by approximately 160 participants from across the country; 75 Mississippi educators, parents, and community leaders and 150 students from Mississippi's Delta region attended the conference. The Consortium staff assisted with the design and development of the conference sessions, contributed $15,000, compiled the conference highlights, and provided some follow-up support.

- The High Plains Consortium cosponsored a conference for the SSI project in Colorado, before the state received its SSI funding, on the integration of mathematics and science; this conference included K-12 teachers and higher education and business representatives.

- FWERC organized and funded a statewide conference for the mathematics and science education communities that brought together 240 providers of mathematics and science resources and training to build networks and began to establish collaborative relationships.

Turning from the supply side to the demand side, a second way that the Regional Consortia support professional development financially is by paying for local educators' attendance and participation at conferences, professional meetings (e.g., state or regional NCTM conferences), or other kinds of training (e.g., a summer institute for science teachers at a university). Consortium staff see this funding as a fairly easy mechanism for providing professional development opportunities to teachers in their regions. Indeed, the director of one Consortium explained that this is how the Consortium spends all the funds it has allocated for professional development.

Examples of this kind of support for professional development include the following:

- The SERVE Consortium provided about $100,000 to support tuition, materials, and travel for approximately 175 teachers from Mississippi and South Carolina to attend algebra institutes. SERVE also collaborated with the Florida Department of Education and the SSI to sponsor 33 teachers to attend a 1-week training session in integrating science; SERVE provided $20,000.

- The Pacific Consortium has paid for regional delegations to attend the Eisenhower megameeting, annual meetings of the NCTM and NSTA, and a training session on the new science benchmarks conducted by AAAS.

- The High Plains Consortium subsidizes professional development opportunities for "underserved and underrepresented populations," particularly for educators located in or serving Indian Nations.

In an example of a Consortium's using its resources to leverage participation in long-term professional development with a particular focus, SCIMAST requires that sites that receive support participate in training that is long term, includes ongoing follow-up, and emphasizes critical-thinking skills and the application of knowledge to learning and teaching. During SCIMAST's first year, 107 teachers received, on average, 10 days of training. Examples of this training included a 10-day training for 35 elementary teachers in Developmental Approaches to Science and Health (DASH), which was provided by the University of Hawaii; a 4-day applied algebra training for 19 teachers; and a 30-day summer institute helping 15 teachers of inner-city minority students provide hands-on experiences with practical applications in mathematics and science concepts.

Two Consortia, SCIMAST and the AEL Consortium, rely on minigrant programs to support more intensive kinds of local professional development in their regions. Local projects funded by these minigrant programs provide training to a large number of teachers or provide extended training opportunities for the participants. The minigrants permit individual projects in the region to operate with some flexibility, using their own trainers and materials.

The SCIMAST minigrant program represents an annual investment of approximately $300,000, or nearly a third of the Consortium's budget. Under this competitive program, the Consortium funds 15 local projects across the region. The request for proposals outlined the Consortium's philosophy of professional development, eligibility requirements, and required program characteristics. Individual minigrants support extended preservice or inservice training opportunities—approximately 10 days per year,

including follow-up—to elementary or secondary mathematics or science teachers. The Consortium's philosophy for these training grants is to fund projects that focus on mathematics and science as "active disciplines," emphasizing critical-thinking skills and the application of knowledge to learning and teaching. Each winning proposal receives approximately $20,000 per year for 3 years, contingent on SCIMAST approval of annual continuation proposals. Grants go only to nonprofit educational agencies (e.g., public and private schools, higher education institutions, and professional associations), and preference was given to proposals that focused on teachers in schools or districts with high populations of at-risk students in mathematics and science, those that collaborated with different agencies, and those that integrated instructional content within and across disciplines. Overall, approximately half of the minigrant recipients (8 of 15) were public schools or districts and one-third were public universities.

The AEL Consortium allocated $100,000 per state for professional development grants. Groups of educators submitted proposals for grants and each state received ten grants of $10,000 each. Grant recipients were required to provide an in-kind contribution equal to half the award. In most cases, the in-kind contribution was teacher time. In addition, teachers who participated in these projects were required to train two other groups of teachers. Originally, these grants were awarded on a competitive basis, but the Consortium staff found that they were reaching too few teachers or those who were not the most needy in the region. Therefore, during the third year of the program, the grants have been awarded on the basis of perceived needs in the region. An example of what Consortium staff feel is a successful minigrant project is funding to a state mathematics consultant to provide training to teachers in every county in one of the states in the Consortium's region. Teachers who receive this training are required to train two other groups of teachers so that the training reaches many teachers around the state.

Both SCIMAST and the AEL Consortium maintain close contact with the minigrant recipients. SCIMAST maintains contact in three ways: (1) a SCIMAST monitor who visits each site twice a year to provide technical assistance and follow-up training; (2) a requirement that grant recipients attend a 4-day training that focuses on appropriate instructional techniques to be used with the teachers that grantees plan to train; and (3) a requirement that the sites submit continuation proposals each year that detail any changes planned for the programs. SCIMAST staff negotiate with the recipient to ensure that the professional development opportunities being offered fit the Consortium's definitions of good professional development; if the negotiations do not resolve the issues the grant

recipient may lose its funds. The AEL Consortium also closely monitors how its minigrant recipients spend their funds. The Consortium does not release funds to a minigrant recipient without appropriate documentation. Therefore, grantees must first spend funds and then be reimbursed for the expenses. Some grantees appreciate this funding mechanism because they do not need to work with their own accounting departments, while others complain that the paperwork is too burdensome for the grant size. The AEL Consortium uses this funding technique as an oversight mechanism—not only to monitor how funds are spent but to maintain contact with the recipients and provide assistance when they feel it's needed.

As several of the foregoing examples suggest, a number of these Consortium activities target support to teachers who work in isolated areas, who work with disadvantaged students, or who do not otherwise have access to professional development and training.

Consortia Provide Professional Development and Training

In addition to paying for professional development by others and for the participation of local educators in professional development, the Consortia conduct a variety of professional development and training activities themselves. Some of these activities are relatively short term, lasting anywhere from an hour to a full day. Others, such as summer institutes, may last several days. Some activities may be one-time events; others have long-term follow-up.

Examples of short-term activities include:

- Staff of the AEL Consortium have presented a number of workshops on integrated mathematics and science activities at state-level conferences and local training events. The workshops tend to have a hands-on format in that attendees participate in activities they can later use with their students. Consortium staff then discuss how the activities can be tied in to what teachers are already doing in their classrooms and how they can be expanded to draw in other mathematics and science issues.

- Staff of the FWERC have developed workshops on alternative assessment and telecommunications. At the day-long alternative assessment workshops which have been presented at conferences in two states, participants receive 2-inch thick binder entitled "Altering Assessment."

- High Plains Consortium staff have presented at a number of state and local conferences around the region, including statewide NCTM conferences, and

intermediate unit and district-level training. Workshop topics include performance assessment, standards and authentic assessment, aligning assessments with standards and implementing assessments, and developing instructional tasks and assessments in mathematics and science.

- Pacific Consortium staff conduct a number of workshops in Hawaii, most of which focus on programs developed by the University of Hawaii's Curriculum Research Development Group (CRDG), a subcontractor to the Consortium.

A number of Consortia provide more intensive professional development services. Examples include the following:

- The High Plains Consortium held a 3-day conference, "New Partners...New Purposes," for 200 educators from the region to explore opportunities for state and regional communication and collaboration in mathematics and science. Participants included representatives from all educational role groups (e.g., state department of education staff, SSI teams, teachers, businesses, state mathematics and science organizations), who attended sessions on topics such as communications, alliance building, and assessment.

- The AEL Consortium held a 3-day summer institute during its first year of funding for 200 teachers, most from elementary schools. Each state nominated 50 teachers who had had little access to professional development on the national mathematics and science standards. The major emphasis of the institute was introducing teachers to innovative classroom practices. Other workshop topics included the change process, classroom restructuring, Internet training, and equity.

- The FWERC was involved in planning, assisting, and leading workshops for the 1993 week-long Arizona Academy for Systemic Reform of Mathematics and Science. The Academy brought together teams of teachers, administrators, and community members from 42 schools to focus on implementing the new statewide curriculum frameworks and assessment system. In 1994, similar teams were brought together, after their schools were named Arizona Journey Schools, for a week-long workshop designed to help them develop plans for restructuring their schools. The FWERC also conducts a series of three day workshops entitled "Weaving the Web." These are intended to help providers of mathematics and science resources learn the capabilities of the World Wide Web and create their own entries for the Web.

- SCIMAST offers two types of intensive professional development opportunities: a 2-day Fall Forum and ongoing training provided to those in the region on request. The Fall Forum, which is conducted each year, is attended by 100 people (20 from each state) who are considered leaders in mathematics and science in the region. The first-year forum focused on standards and the second-

year forum on professional development. According to SCIMAST staff, almost all forum activities are interactive, and no one is a "talking head" for more than 15 minutes. SCIMAST also designs and provides training on request in the region. However, those requesting service must meet specific requirements: allow approximately 10 days over the year for training and follow-up with the same group of teachers, be interested in constructivist teaching, and allow practice with students. The director says the Consortium will not fund day-long workshops, except where the goal of the workshop is awareness. After the site has agreed to the training requirements, a SCIMAST trainer meets with site staff to determine their needs and then develops an appropriate training program. The Consortium uses these training activities to leverage local support for long-term professional development. Although the Consortium pays for some combination of stipends, substitutes, and materials, it asks that the school district make a financial commitment to the training process.

The Issue of Long-Term Follow-up in Professional Development

Only if it extends over a period of time can professional development take into consideration participants' backgrounds and knowledge, engage teachers in the subject matter (beyond the "hands-on" workshop), and provide teachers with a mechanism to see the connections between student learning and classroom practice. Yet, planning and conducting institutes and other long-term professional development requires significant time and resources. For example, one SCIMAST staff member estimated that it took her 15 days of planning to provide a 10-day professional development program. These activities also tend to reach a limited number of educators in the region. In contrast, single-contact workshops, particularly those delivered at conferences (e.g., 1- to 3-hour presentations), tend to be fairly easy for Consortium staff, and can reach a large population of teachers in the regions, broadening the Consortium's constituency.

Therefore, Consortium staff face a trade-off: expending significant resources to develop and provide long-term training opportunities for a limited number of educators or providing an introduction to a subject for a large number of educators. For the most part, they resolve this trade-off more in favor of breadth than depth, although, as our discussion illustrates, there are important examples of long-term support in professional development. Consortium resources do not permit extensive follow-up with large numbers of participants in professional development. There is, for example, little documentation of direct follow-up with teachers and others who receive Consortium funds to attend meetings and other kinds of professional development opportunities. The Consortia may add individuals' names to mailing lists and ensure that they receive copies of materials that the Consortia disseminate.

One way that the Consortia expand the scope of professional development and ensure appropriate follow up is by using their resources to leverage other support. Requiring schools or districts in which teachers receive professional development resources to contribute some of their own resources is one way of doing this. At the state level, there are a numbe. of examples of the Consortia working with NDN state facilitators to support professional development. We review two of these activities, which are carried by the Regional Alliance and the Midwest Consortium, in more detail in our discussion of Consortium support for networks and teams. In these examples, the Consortia provide funds for professional development and staff contribute a considerable amount of direction and assistance to the professional development. In both cases, there is a strong working relationship between the Consortia and the NDN state facilitators in the regions. Another possibility for this kind of partnership is with professional development projects supported by Eisenhower state programs. Although directors and staff from these programs participate as members of Consortium advisory boards and at meetings and other events convened by the Consortia, our interview data as well as our review of Consortium proposals and reports indicate few well-developed partnerships between the Consortia and the Eisenhower state programs.

Summary

The Consortia support professional development in two ways: by funding it (either through financial and in-kind support to providers or through financial support to participants); and by directly delivering it. Through both avenues, the professional development supported in this program encompasses both short-term and long-term offerings on a wide range of current topics in mathematics and science education. Targeting strategies have varied considerably, but like any new organization each Consortium has welcomed the targets of opportunity that it finds. In later stages of this evaluation, we will assess the reported contributions of these offerings, based on data from a broad selection of participants. For now, we can observe that the Consortia have used short-term events and financial support as vehicles for introducing themselves in their regions, and that in many instances they have pushed toward a longer-term vision of professional development through such means as leveraging funds from other sources.

Although professional development looms large in the portfolio of Consortium activities, it is not the only thing they do. If we had data on the proportion of funds spent in each category of activities (which we do not), we imagine that professional

development would account for less than half of program funds. We turn now, therefore, to the other categories of activities.

Consortium Support for Teams and Networks

All the Consortia, like the regional educational laboratories in which they are located, engage in a variety of convening and network-building activities. As a report by the Consortia to Sen. Hatfield indicated:

> State and regional advisory groups are core collaborative partners for the Consortia. They provide the forum within which a broad range of mathematics and science education groups collaboratively assess needs, evaluate the resources each has to offer, and work together for systemic improvement.

Responding to ED's charge to work with state-level actors on their reform agendas, this category of activities and services involves the Consortia in a variety of relatively long-term relationships with state and multi-state groups. Consortium support includes paying for participation in team and network events, facilitating meetings and other activities, and staff support for projects.

Support and assistance for the work of a variety of state and regional networks are prominent features in seven of the Regional Consortia. In two Consortia, the Regional Alliance and the Mid-Atlantic Consortium, convening and supporting state and/or regional networks are signature activities.

The Regional Alliance's Regional Networks and Statewide Action Teams

The Regional Alliance has established "Statewide Action Teams" in each of the entities in its service region. It has also created networks across the region, each focusing on a key theme in reforming mathematics and science education: assessment, curriculum frameworks, equity, higher education/K-12 collaboration, professional development, public engagement, and technology and telecommunications. Members of the regional networks include staff from schools, school districts, state departments of education, Eisenhower State Curriculum Frameworks Projects and SSI projects, institutions of higher education, and professional associations. Most network members have strong interest in or responsibility for working in the substantive area around which the network is organized. In addition, membership in several of the networks includes teams from the entities served by the Consortium. For example, the Equity Network is composed, in part,

of local teams responsible for "addressing equity-related components" of mathematics and science reform initiatives. According to Consortium reports membership in the networks also includes people from around the country who share an interest in the network topic or theme. The state teams include members of most of the role groups represented in the regional networks. Typically, the state teams include 10 to 15 members; the networks are much larger.

The Consortium supports these networks and teams in several ways. First, the Consortium pays many of the costs of individual participation, primarily transportation and lodging costs. Second, the Consortium facilitates the meetings of the regional networks, although Consortium staff report that a sign of progress on the state teams is that the team members have begun to play a more active role in setting their agendas. Third, Consortium staff are in frequent contact with network and team members by telephone and through the mail. Consortium staff describe these contacts as "ongoing technical assistance."

A fourth way that the Consortium supports the regional networks is through electronic bulletin boards and e-mail systems. Network members receive computers, software, and accounts if they need them in order to communicate with each other and with the Consortium. The Consortium has created electronic listservers, accessible through the Internet and America Online, to facilitate communication and the sharing of information. These include messages from the Consortium about activities and upcoming events. There is also information about recent developments in the field, including recently released reports that are likely to be of use to the team members. These listservers also provide a vehicle for users to ask questions of the entire network. Finally, Consortium staff report efforts to raise issues or pose big-picture questions to the network as a way of stimulating dialogue in the network and, in the words of several Consortium staff, turning these networks into virtual communities of educators and policy makers across the region.

At the time of our data collection in 1994, the regional networks and state teams were in different stages of development. The teams and networks were typically organized out of meetings convened by the Consortium during the first year of operation. According to Consortium reports, these events were opportunities to inform participants about the Consortium and its resources, for the participants to begin planning the work of the teams and networks, and for the Consortium to conduct workshops and receive requests for additional assistance and resources. Following these large events, the

Consortium continued to work with the networks and teams in a variety of ways, depending on what their tasks were. Consortium help included assistance in planning, follow-up workshops and training, and dissemination. Often, the Consortium paid the costs of participation in these activities. In addition to follow-up with individual members of the networks and the state teams, the Consortium also convened other large regional events intended to bring the members together to share their experiences and progress on their various tasks.

Compared with the state teams, the regional networks appear more task oriented as they attempt to address substantive issues. For example, the Regional Assessment Study Group is made up of trainers who provide professional development in assessment for educators in their school district or state. This network has been organized and led by the Education Development Center and the Educational Testing Service, two of the Consortium partners. Network activities have included workshops and professional development activities intended to familiarize participants with new assessment strategies and prepare them to help others implement new assessments. Network events are also occasions for the participants to exchange information and ideas about assessment. As we noted above, one purpose of the Equity Network is to bring together district-level teams from each of the entities served by the Consortium to develop plans for addressing the equity-related dimensions of reform in mathematics and science education. At the time of our fieldwork, the Consortium was committed to providing up to 7 days of follow-up technical assistance to each of the teams in this network. This network also includes state-level representatives who can work with the teams and draw on the teams' experiences to inform state policy and program development. Finally, the Consortium reports that the network also includes "nearly all of the nation's SSI equity experts," who are linked to other members electronically.

One important function of the teams and networks is to serve as vehicles for using Consortium resources to leverage other resources for mathematics and science reform. For example, one requirement for membership in the assessment network is support from a district administrator, including a commitment on behalf of the district to sponsor assessment-related professional development activities. These activities are to be conducted by the participants in the assessment network. A second example of using Consortium resources to leverage other resources is the state teams' process of deciding how to use a $10,000 allocation the Consortium makes to the NDN state facilitator in

each of the states. An NDN state facilitator who serves on a state team shared the following explanation with us:

> "Eisenhower funds from the SEA are being used to train teachers to revise their teaching to reflect the approach of the NCTM standards. The problem is that the teachers are not receiving program materials, curriculum ideas, or follow-up assistance. The Regional Alliance provided funds for us to work with a lot of teachers. We provide training, program materials, curriculum ideas, and follow-up assistance. The Regional Alliance is fulfilling a very useful role in this state. The Alliance provides $10,000 in financial support each year. This has enabled me to leverage a lot of other money. For example, the SEA has funded us for $17,000 to run one workshop. We're working with a college to offer workshops for science teachers. We've got $4,000 from the Private Schools Facilitator to work with private schools."

Several other NDN state facilitators reported similar experiences.

In addition to serving the interests of their members and the organizations they represent, the state teams and regional networks serve the interests of the Consortium by providing a medium for Consortium activities and services and, more generally, by legitimizing a role for the Consortium in the states and the region. Their broadly based membership also enables the Consortium to avoid an exclusive link to a particular agency or project. A laboratory manager explained the significance of the state teams in this way:

> "We would be hesitant to go only to an existing structure or project because reform is so political and so bound by turf. If you go into existing groups or projects, you are not being neutral.... This doesn't mean that you don't plug in to existing groups.... Our state teams make these connections. The members have some leadership roles, they have authority, and they play an ongoing needs assessment role. The danger would come if their membership becomes static."

The Mid-Atlantic Consortium's State Teams

During the first year of operation, the Mid-Atlantic Consortium director began working in each of the states and the District of Columbia to identify and bring together key people in mathematics and science education. Teams have since been established in each of the entities, with a member of the Consortium staff assigned to work with each team. The Consortium allocates about one-third of its annual budget for the state teams, using a formula that considers the number of classrooms in each entity. In fiscal year 1994, allocations included $40,000 for Delaware and the District of Columbia, $70,000

for Maryland, $125,000 for New Jersey, and $150,000 for Pennsylvania. The primary responsibility of the state teams is to determine how these funds should be spent in their states. As a Consortium manager put it recently, "except for the regional conferences, everything else (e.g., professional development) the Consortium supports occurs at the bidding of the state teams or their steering committees."

There is broad-based representation on the formal membership lists, but actual participation by individual members is uneven. Consortium staff point out that the "District of Columbia team has met most frequently [9 times in 1994], but usually with a changing group of attendees." In Delaware, fewer than half the members attended the two 2-hour meetings held in 1994. A somewhat frustrated Consortium staff member observed simply, "If they don't have much of an interest, they don't come." In Pennsylvania, the state in which the Consortium staff say there has been steady progress, only about one-third of the state team's 122 members attend the meetings. At the time of our fieldwork, Consortium staff agreed that, of the five teams, only the one in Pennsylvania has really started to work as a group. A Consortium evaluation report on the work of the state teams found that, despite the diversity on the membership lists, several of the teams tend to be dominated by state department of education staff.

One of the first steps in establishing these teams has been to develop a mission statement. Consortium staff assumed responsibility for drafting the mission statements and presenting them to the teams for discussion and comment. A second responsibility of the staff has been to convene and, in some cases, facilitate the meetings.

At the time of our site visit, a key issue was how to assign fiscal responsibility for the funds allocated to each state. For example, in one state, the state department was to assume responsibility, but there were problems with the solicitation and decision-making process: most, if not all, of the money went to places where active members of the state team were employed. In the remaining states, it appeared that the funds would continue to be administered by the Consortium. Staff explained that this was the result of the teams' inexperience in running grant programs. It is also possible that the state teams were simply not ready to take over any formal responsibility.

Other Examples of Consortia's Support for Teams and Networks

Several additional examples help illustrate how the Regional Consortia have convened regional groups around issues and tasks.

At the Midwest Consortium, "Institutes for Professional Development Providers" is a collaborative venture with the NDN state facilitators in the region. Twenty-person working groups from each state were convened at a 3-day professional development institute in the summer of 1993. The goals of the first institute were to create the state teams, to communicate information and strategies for effective professional development, to provide an opportunity for sharing across the states, and to develop plans for professional development to support systemic reform in mathematics and science education in each state. Teams met again a year later to review their progress and continue sharing ideas. In the interim, Consortium staff worked with state teams on further development and implementation of their plans. The Consortium also provided financial support for meetings and other activities.

The goal of "Moving Mathematics and Science Assessment into the 21st Century," a second intensive professional development project at the Midwest Consortium, is to promote the use of alternative assessments as ingredients in reforms of mathematics and science education. The project began with a 3-day institute for 12-person teams from each of the states. Activities included modeling classroom strategies for linking curriculum, instruction, and assessment through the use of performance tasks and questioning; examining issues related to the design, implementation, and impact of authentic assessments; and designing professional development programs to support implementation and use of the new assessments. As a follow-up activity, the state teams were encouraged to develop action plans for use in their states and school districts.

The Pacific Consortium has convened the Pacific Mathematics and Science Leadership Team made up of educators from the far-flung entities of the Pacific region, to take on the task of drafting curriculum frameworks for the region. Drafts of content standards in mathematics and science were completed in 1994, following a series of week-long writing sessions at different venues in the Pacific region. The Consortium provided funds to support the writing task. The meetings were facilitated by mathematics and science specialists from the University of Hawaii's CRDG, under a subcontract from the Consortium. Finally, the Consortium has worked with the leadership team to develop what a Consortium report describes as: "a discussion and review process for standards that is as important as the Pacific standards document itself. It is a model for engaging teachers, parents, administrators, and community leaders in systemic improvement of mathematics and science education."

The Teachers' Certification Roundtable, the Instructional Resources Committee, and the Professional Development Committee are regional working groups convened and supported by CMAST. Each working group has representatives from each state with special expertise who work on issues related to teacher certification, curriculum materials, and professional development. Consortium support for these groups includes convening and facilitating meetings and preparing draft reports for members' review and comment.

The work of the Certification and Teacher Education Roundtable has resulted in a draft set of recommendations; the final version is scheduled for completion in September 1995. The document outlines a regional certification system and specific certification standards, based on national standards, for elementary, middle, and high school teachers. The draft report also calls on teacher training programs to model the kinds of teaching behavior that teachers are expected to use in their classrooms.

The Instructional Resources Committee is charged with identifying the instructional resource needs of the region, developing "an Evaluation Framework for Instruction Resources in Mathematics and Science that will empower educators to discriminate among the numerous instructional resources available," and "advancing understanding on issues surrounding instructional resources in mathematics and science education." At the time of our data collection, work was still under way on a draft of the document. The Professional Development Committee also had plans to publish a document. Their publication is designed to communicate models of good professional development and cite examples of innovative efforts in the Northwest region.

Potential Contributions and Issues in Support for Networks and Teams

Our data clearly indicate that teams and networks can serve useful functions for the states and the regions. The comments of the director of a university-based center for mathematics and science education describe one of the potential benefits of Consortium support for state teams:

> "The only initiative that is truly statewide is the state's involvement with the [Consortium]. This state is characterized by turf protection and long-standing battles. It has not been easy to develop systemic initiatives here because of all of the infighting. For example, [state] failed in two SSI proposals...Working with [the Consortium] has given us the opportunity to do some work on the relationship between institutions of higher education and K-12 education. We have pooled our human and financial resources."

Some of these groups have already generated products that can be used as resources to guide and support reforms. The processes of coming together and developing the products also can form the basis for ongoing exchanges of ideas and collaborations. Finally, the groups can use Consortium resources to leverage other resources.

For the Regional Consortia, teams and networks offer ways to gain access to states, professional mathematics and science education communities, and ongoing reform initiatives. Initial meetings of the groups enabled the Consortia to announce their presence, to offer their services and financial resources, and to create processes—the networks and teams themselves—through which communications can continue. The continuing convening and facilitating services, in turn, become vehicles through which the Consortia can package and provide additional services. For example, the Regional Alliance charges its networks with identifying the needs of the states of the network participants (e.g., planning and conducting local professional development in assessment, planning and implementing the equity dimensions of mathematics and science education reforms).

In addition to their benefits, there are some potential disadvantages of those arrangements. First, because the Consortia organize the networks and teams, they may be seen as owning them and their activities. As one state department staff member explained:

> "We talked about the state team for a long time.... For us, the state team was just another layer, and I felt like it existed to serve and to justify the existence of the [Consortium]. The team is largely dysfunctional because it does not have any purpose except to serve the lab. We already had an advisory committee [to guide our work]. They [the Consortium] had an idea about what the team was to look like and what it would do. I don't think that the states were in the center of their plans."

Second, a state and regional group operating as a separate entity may not have any authority to speak for its state or members' home institutions, with the result that the network or team has little or no real power. In one state where the team members do not represent state or local programs, several team members commented that they were "not sure whether anyone other than the members of the team knows we're here." In another state, the Consortium concluded that the only way to have an active state team was to designate the state's SSI project advisory group as the state team. A Consortium staff member who works with state teams on professional development issues explained this issue as follows:

> "We've really struggled with [the state teams] to help them find some niche or authority so that they can plan for what they can do. They do have some authority and control. They can come together in a learning community. The challenge is to help them find something that is doable. We need to spend a lot of time helping them see the connections."

These comments demonstrate something of the challenges the Consortia take on in working with networks and teams, and they help explain why significant amounts of Consortium activities address process issues. The payoff remains to be seen, but in the early stages some teams and networks reflect a somewhat worrisome circularity of structure: having been created by the Consortia, they may, at worst, exist primarily to draw on Consortium resources without having the authority to serve their regions in effective ways.

Summary

Most of the Consortia provide support to state-based teams and/or cross-state networks of professionals in mathematics and science education. Their support has been significant, in some cases enabling such teams and networks to get off the ground and to begin addressing practical problems. Some of the groups have generated products. At the early stage of team and network operations when our fieldwork took place, however, a number of the teams and networks were, at best, searching for a set of tasks to undertake. Thus, we intend to revisit the issue of these groups' progress as this evaluation proceeds.

Task-Specific Assistance

As part of their effort to become credible partners in state and local reform initiatives, the Consortia have provided help on specific tasks to advance these initiatives. As we found, these activities thrust Consortium staff into a variety of roles and relationships with many different constituents. Examples of task-specific assistance provided by the Regional Consortia include the following:

- Consortium staff provide direct assistance to state agencies and school districts on tasks included in mathematics and science reforms (e.g., developing frameworks, developing assessment instruments, implementing performance-based assessments) (FWERC, CMAST, High Plains, Midwest, Mid-Atlantic, Appalachia, Regional Alliance, SCIMAST).

- Staff from several Consortia advised or served on committees responsible for preparing proposals for Eisenhower State Curriculum Frameworks Project grants, for SSI grants, and for other activities related to mathematics and science

education reform (High Plains, CMAST, Mid-Atlantic, Midwest, Appalachia, Regional Alliance, FWERC).

- Consortium staff conduct or assist in evaluations of State Curriculum Frameworks Projects, SSI projects, and products developed by these projects (FWERC, High Plains, Regional Alliance, Mid-Atlantic, CMAST).

- Consortium staff assist partners (e.g., NDN state facilitators, Eisenhower mathematics and science education programs, State Curriculum Frameworks Projects, SSI projects), teams, and state and regional networks in organizing and convening meetings. Consortium staff often assume the role of facilitator at these events (SERVE, Mid-Atlantic, Regional Alliance, Midwest, High Plains, CMAST, SCIMAST).

- Consortium staff work with teams and networks organized by the Consortia to carry out specific tasks and activities (Pacific, CMAST, Midwest, Regional Alliance, SCIMAST, Appalachia).

The Content and Recipients of Task-Specific Assistance

Consortia have assisted with substantive tasks in mathematics and science education (e.g., developing assessment items, implementing new instructional practices or content, implementing assessment systems, articulating standards and frameworks in mathematics and science education) and process tasks (e.g., planning and facilitating meetings, setting agendas, and planning for projects). Consortium reports and our interviews suggest that the primary focus is on process. As a Consortium staff member who works with state teams throughout the Consortium's service region told us:

> "Because of where [the states] are in [making decisions] about implementing things like the NCTM standards and other new ideas, our role is about 60 percent facilitator and 40 percent content specialist. Earlier, we played even more of a facilitator role."

These services are directed primarily to state and regional groups and organizations, although some go to school districts or schools. Task-specific assistance to states includes, among other things, assistance to Eisenhower State Curriculum Frameworks Projects and SSI projects. In these activities, Consortium staff may serve as consultants to a state department or as consultants to or members of writing teams. They may assist in writing proposals, frameworks, or other products. This help is available at no cost to the states. Several Consortia have contracts to evaluate the Eisenhower curriculum framework projects. Consortium staff may also assist these projects in planning meetings and other events and procedures associated with the initiatives. For example, the Mid-

Atlantic Consortium assisted the New Jersey SSI project in carrying out a competition to support local pilot projects to implement systemic reforms. In some cases, the Consortia also provide funds for the events, thus making possible an activity or development task that otherwise might not have occurred.

At least one Consortium, the FWERC, works with state agencies in other ways. For example, a Consortium staff member works with Arizona's state agency staff on the development of items for the state's new assessment system. With Utah, the Consortium director has worked extensively on all phases of the development of a curriculum framework in science.

A substantial portion of the task-specific assistance provided by the Consortia is directed to teams and networks that the Consortia have created. Consortia assist these groups in planning and carrying out the tasks they set for themselves. For example, staff at CMAST facilitated meetings, provided background materials, and worked on drafts of reports prepared by the Certification and Teacher Education Roundtable, the Instructional Resources Committee, and the Professional Development Committee. Staff at the Regional Alliance work extensively with the state teams and networks the Consortium has created. Assistance ranges from helping members of the assessment network prepare professional development activities for their districts to helping the state teams plan what they are going to do. The Consortia also provide some financial assistance to support participation in these activities.

Duration of Task-Specific Assistance

Much of the assistance provided by the Regional Consortia extends over a long time. Consortium reports and interviews with Consortium staff indicate that once the Consortia establish relationships with recipients of their services, they make every effort to maintain these relationships, sometimes by offering a series of meetings or workshops. Consortium staff and people we spoke to in the field report that the Consortia are diligent about follow-up telephone contacts to offer additional assistance and to provide advice and information that recipients need or ask for. This follow-up not only extends the duration of the assistance but increases its intensity.

Significance of the Task-Specific Assistance for the Consortia

In the next phase of this evaluation, we will examine the impact and benefits of these services. The following comments from the director of an Eisenhower State Curriculum

Frameworks Project, who is a very satisfied customer, suggest something of the impact that Consortium assistance can have:

> "[The laboratory] and the Consortium have been such a blessing for us. They have supported this framework project to the hilt. They worked to plan meetings of the advisory board, they provided staff development for teachers who were to conduct training [related to the implementation of the framework]. They helped explain the difference between PBE and competency-based education. They even provided copies of Benchmarks for every school. The Consortium has been a real partner in all of this.... [The Consortium staff member assigned to this activity] is so energetic and totally responsive. I call with an idea and she can help me wade through it. By the time I am off the phone, she has solved my problem and taken me to new levels. They really put their money where their mouths are. We participate in many activities for the region, and because of our close relationship with [the laboratory], we play a key role in Consortium activities."

These comments typify several key themes about the services provided by the Consortia. As Consortium staff told us repeatedly about almost all of their early activities, task-specific assistance showcased what the Consortia could do and their eagerness to do it. Up-front commitments of assistance and dollars that would be available over several years not only opened doors but helped to convey the idea that the Consortia were going to be around for a while. Finally, Consortium staff generally agree that relationships that involve them as partners help build a foundation for additional partnerships.

The Consortia provide relatively little of their task-specific assistance to the local level, reflecting a dilemma that they face along with every other federal technical assistance provider. Long-term, intense assistance is expensive. Consortium resources would permit them to work with a relatively small number of local sites; if that small number increased, the Consortia would have to eliminate other services. As one Consortium director told us: "I just can't afford to work at the local level." At the time of our fieldwork, NSF's Urban Systemic Initiatives were just getting started, and several Consortium directors told us that they were trying to build working relationships with these new projects. Examining whether these relationships do develop will be a task of the next round of this evaluation. As the Consortia's portfolios of service suggest, one solution to the dilemma of where to invest relatively modest resources for direct service is to work at the state and regional levels with the expectation that this assistance, coordinated with other resources, will benefit teachers and students in the end. Whether

the Consortia's activities and services have worked this way will be another important topic for the next round of this evaluation.

Summary

By pitching in with the development of frameworks, proposals, evaluations, meetings, or other tasks, the Consortia have been able to introduce themselves as a resource to a variety of potential partners and service recipients, particularly at the state level. At least in the early stages of their operations, they were finding more of a niche in process tasks (e.g., convening meetings) than content tasks (e.g., developing assessments), but the mix could change over time as both the Consortia and state initiatives mature.

Dissemination

All Consortia produce and disseminate materials through mail and electronic means. In addition, they identify "promising" practices and disseminate this information to their regions. Overall, these dissemination efforts use a small portion of Consortium resources relative to their other activities.

As we reported above in discussing the original vision for the Regional Consortiums Program, dissemination of information about successful practices in mathematics and science education was to be one of the main tasks for Consortia. This task was to be carried out in coordination with the ENC and the other Consortia. We found that the Consortia have been actively engaged in disseminating information and that there has been progress in using technology to make the task more efficient and to reach larger numbers of people. Much of the progress has come through the efforts of individual Consortia or Consortia working together, as in the efforts to identify promising practices. Delays outside of the Consortia's control slowed the pace of early progress in working with the ENC.

Dissemination of Print Materials

All Consortia disseminate materials, although this is a relatively low-intensity activity for the program. Materials disseminated include newsletters, other Consortium products, and non-Consortium products.

Newsletters, developed by all the Consortia, vary in frequency, content, and intended audience. For about half of the Consortia, newsletters represent the largest product-

development effort they make. Overall, the newsletters are vehicles to introduce the Consortia to their regions and to share information about resources and activities.

Newsletter production occurs anywhere from once to five times per year. Approximately half the Consortia disseminate their newsletters quarterly, while the other half disseminate them less frequently—or whenever they can be completed. Newsletters are sent to a large number of people in each region, with mailing lists ranging from approximately 2,000 to 16,000 recipients. The Mid-Atlantic Consortium sent the December 1993 issue of its newsletter to every school in the region. SCIMAST sent its first two newsletters to a mailing list of 13,000. In an effort to reduce this mailing, reply cards were included with the newsletters asking recipients whether they wanted to be on the newsletter mailing list; approximately one-quarter responded.

Most newsletters provide information on the Consortium and its activities, but few have this as their only focus. Most include informational articles on mathematics or science topics, with discussions of resources, events, and promising practices. Two Consortia develop newsletters on specific topics. The Regional Alliance develops newsletters around specific topics such as assessment, equity, K-16 collaboration, curriculum, and professional development, which correspond to the topical foci of the Consortium's regional networks. SCIMAST developed newsletters on cooperative learning and on working for reform. Each contained information on available publications and provided two classroom activities—one for elementary teachers and one for secondary teachers—that included discussions of how to make these activities work effectively in the classroom.

The audiences for the Consortium newsletters also vary. Some newsletters are aimed primarily at teachers; others are written for a much broader audience. For example, the Pacific Consortium, SCIMAST, and SERVE publish newsletters that contain activities for teachers. The Pacific Consortium newsletter describes activities that are usable in the region, such as using mangoes for an integrated mathematics and science lesson and a hands-on activity using taro stems to show how stems move water in plants. Some of these activities are provided by teachers in the region and others by Consortium staff. The SCIMAST newsletter is sent to every school building in the state, and the Pacific newsletter goes to all mathematics and science teachers in the region. On the other hand, the Regional Alliance newsletters are distributed to all members of the Consortium networks, which include representatives from all educational role groups.

In addition to the newsletters, Consortia produce and disseminate some mixture of the following: workshop materials, conference proceedings, brochures on the Consortium, policy briefs, and resource guides. A few Consortia have researched and developed hefty reports, which they disseminate. Examples include:

- *Equity in the Reform of Mathematics and Science Education* (SCIMAST), a 175-page document that provides a review and synthesis of a number of equity issues, including the relationship between gender and culture and success in mathematics and science and issues raised by efforts to finance school reform. The Consortium produced an executive summary, which was sent to every school building in the region. The report is available on request.

- *Dynamics of Alliances* (High Plains), a conceptual paper on collaboration, alliance building, and communication. It is the basis for all Consortium discussions on enhancing communication and coordination within and across the states in the region.

- *Crossing Boundaries: Explorations in Integrative Curriculum* (CMAST) explores strategies for developing integrated curricula. This publication has been widely distributed in the region and won an award from the National Federation of Press Women.

An important activity for the Pacific Regional Consortium has been the development of mathematics and science standards for the Pacific region. The Consortium convened educators from all the entities to develop the standards, and it has disseminated 500 copies of the draft standards throughout the region.

Nearly all the Consortia disseminate products developed by others. The most common documents for distribution are the *Guidebook to Excellence* (ERIC National Clearinghouse), *EDTALK* (CEDaR), and LNP's promising-practices books. The Consortia that disseminated these documents gave them wide distribution—the Pacific Consortium sent the promising-practices set to approximately 3,000 teachers, and SCIMAST sent *EDTALK* to every school building and superintendent in the region. Consortia also disseminated laboratory products and other products developed in the region. For example, the Far West Consortium printed and distributed 50,000 copies of the *SEABA Journal*, developed by the Science Education Academy of the Bay Area (SEABA) which highlights the Academy's activities and promotes telecomputing, and 10,000 copies of the *California Mathematics Resource Guide*.

Identification of Promising Practices

The scope of work for the Regional Consortia called on them to identify and disseminate exemplary mathematics and science education materials. The general process for identifying these practices includes calling for nominations from the region, evaluating the nominations on the basis of predetermined criteria, and visiting the practice sites. Programs are evaluated on the following criteria: program features, match with national standards, innovativeness, effectiveness, and transferability. Programs can be nominated by their developers or by anybody familiar with the programs, and can range from an individual classroom activity to a systemwide reform.

The Laboratory Network Program (LNP) had been conducting this work prior to the funding of the Consortia. At the time of our visits, the Consortia were taking over the task from the LNP and beginning the process of identifying practices. Despite the LNP experience, the identification process was slow to get under way. Some Consortia had not yet identified programs for national review, whereas others had submitted between 4 and 12. Calls for nominations occurred through the Consortium newsletters, conferences, regional networks, and state teams.

Following a request from OERI and to avoid confusion with NDN dissemination activities, the task changed from identifying *exemplary* practices to identifying *promising* practices. This change in terms makes the review process somewhat easier because the requirement for outcome data is less stringent. As one Consortium staff member said, the review process is not as rigorous as that used for the NDN because "these are promising practices; they're not set, so you don't need established [outcome] data."

The identification and dissemination of promising practices is an activity that adheres closely to the statutory charge to the Regional Consortiums Program. In Sen. Hatfield's original vision, leadership was needed in order to bring existing resources to the local schools that could use them. As this activity matures beyond a focus on identification to a focus on dissemination and follow-up, its effects will be worth monitoring.

Consortia's Uses of Technology for Dissemination

All of the Regional Consortia are committed to increased use of technology in dissemination, and the growing use of technology for this purpose is an important part of their developing capacities to serve their regions.

Under the terms of their grants, the Consortia were required to work with the ENC to establish and operate technology demonstration sites. At the time of our visits, the technology demonstration sites were just beginning to open. In a number of Consortia, the director and staff explained that the delay in developing and promoting sites had occurred because the ENC was just beginning operation and that without access to the ENC, the demonstration sites had little to demonstrate to teachers.

To facilitate access and increase use of the technology demonstration sites, some of the Consortia are experimenting with locating them in sites other than the Consortium offices. Examples of these experiments include:

- The FWERC has located its demonstration site at the California Academy of Sciences (CAS), which is located in San Francisco's Golden Gate Park. As well as housing a library with eight computers, CAS has an aquarium and a planetarium and receives over a million visitors per year. Teachers who visit to use the demonstration site receive free admission.

- The Midwest Consortium has housed its demonstration site in the Leon Lederman Science Center at the Fermi Laboratory, a national energy laboratory. The Lederman Center serves as a clearinghouse for science educators' materials and resources and features a number of interactive teaching/learning stations that expose visitors to basic scientific principles. The primary users of the technology demonstration center have been curriculum developers.

- The Pacific Consortium has developed a rotating venue for its site because the distances between the entities are so great. During its first year of operation, the site was housed in Hawaii, the Northern Mariana Islands, and Palau. In 1995, it is scheduled for two additional entities.

- The AEL Consortium and CMAST found that few teachers visited the demonstration sites within the Consortium buildings, so they have acquired laptop computers to transport the technology to teachers. The AEL Consortium is beginning to develop presentations and teacher training modules to accompany the software the Consortium plans to demonstrate.

In addition to their initial work on the technology demonstration sites, 9 of the 10 Consortia have created databases that can be accessed through the Internet. Some databases can also be accessed through gateways to the Internet, such as America Online. A recent development in the organization of these databases—and an example of the Consortia's networking activities—is that it is possible to access some databases from the others. The path from one Consortium's database to another is not always clear—not

unlike other parts of the Internet, but with a few experimental clicks, users can find their way around the databases relatively easily.

On the basis of our preliminary review of the databases, we offer a few observations. The databases vary considerably in their content, scope, and style of presentation. Several are quite extensive, containing a variety of information for a range of user groups. Others are quite limited, consisting primarily of information about the Consortia and Consortium services. With the notable exception of NCREL/Midwest Consortium's Pathways, there is very little detailed information about successful programs and practices, with the result that users must take the initiative in seeking this additional information. As we described in our discussion of support for teams and networks, the Regional Alliance has created electronic networks for members of these groups, and the network bulletin boards contain much information about network activities and topics of interest.

Summary

For a relatively modest investment, the Consortia have blanketed their regions with products. Newsletters (often, but not always, targeted to teachers) are ubiquitous across the Consortia. At the other end of the product spectrum are a small number of more substantial reports that have been developed and disseminated with Consortium resources. The Consortia have also worked together on an effort to identify promising practices in mathematics and science education. Working with the ENC, the Consortia operate technology demonstration sites. These demonstration sites, along with the development of a variety of electronic databases, represent important new dimensions of their capacities to serve the regions. Subsequent phases of the evaluation will examine customer satisfaction with selected Consortium products and the continued expansion of the Consortia's use of technology for dissemination and other kinds of assistance in their regions.

Using Consortium Resources to Purchase Materials and Equipment for Mathematics and Science Education

One of the ways that the Regional Consortia support school- and classroom-level efforts to improve mathematics and science education is to make Consortium funds available to purchase materials and equipment, including computer hardware and software, and accounts for access to the Internet or services such as America Online.

In three Consortia—the Mid-Atlantic, the Appalachia Regional Consortium, and the Pacific Consortium—minigrant programs offer funds that can be used to purchase

materials and equipment. The Appalachia Regional Consortium operates two such programs. According to the Consortium's solicitation for its Equity Minigrants Program, the program supports efforts to "increase access for low-income, minority, female, and physically impaired students." The primary recipients are teachers, who typically use the money for materials and field trips. The Consortium made 16 awards in each state of the service region during the first year of the program and 10 in each state during the second year. According to Consortium staff, criteria for selecting the winning proposals are that they must show (1) a "real connection" between the activity and the needs of a specific population and (2) how the materials will be incorporated into instruction. Proposals are reviewed by a panel of teachers from across the region.

The second program at this Consortium allocates about $12,500 to each state for awards of up to $500 to teachers for hardware and software so that they can access the Internet. The teacher's school or school district must agree to match the amount of the award. Thus, these awards represent an example of how the Consortium uses its funds to leverage other resources and targets them to classrooms.

The Pacific Consortium provides a fixed amount of money to each entity ($20,000 to $30,000), and schools within the entities write grant applications for the funds. Although some of these funds have gone for professional development for teachers, most have gone for fixtures, furnishings, materials, and supplies. The Mid-Atlantic Consortium, the Regional Alliance, and the Midwest Consortium have offered teachers and other educators computer hardware, software, and accounts for access to the Internet or an on-line service. In addition, many Consortia have provided training to teachers and others on how to use the technology, particularly to gain access to the Internet and to services such as the Consortia's on-line databases.

Consortium staff generally agree that the goal of making funds available for these purchases is to enhance educators' capacity to do their jobs. In the area of technology, they point to two benefits: dramatically increased access to information and ideas, and access to other people in the field. The Mid-Atlantic Consortium supports a small pilot project to see what uses teachers made of the new communications technology once it was available to them and they had had some training in how to use it. Preliminary findings were that many users were very enthusiastic about the potential of the technology but did not have time to make much use of it, and that people who were already familiar with computers were more inclined to use them than were inexperienced users. The evaluation also found that users appreciated the authenticity of the some of the content to which they

gained access, such as materials made available by the National Aeronautics and Space Administration.

Summary

At this point, we have very limited data on how the materials and equipment purchased with Consortium resources are being used and what differences they have made. Nevertheless, even in the absence of such data, it seems reasonable that there have been payoffs, some possibly quite large, for individual teachers, their students, and their schools. Viewed this way, these look like good investments, particularly when they are supported by help in using what is provided and when they leverage other investments, as in the case of the Technology Matching Grants. At the same time, the immediate benefits in fact accrue to very small numbers of people in very small numbers of places. It will be important, though difficult, to examine the multiplier effects of these investments in the future.

A more ambitious and costly initiative is the recent development and early field test of a sophisticated interactive database at NCREL and the Midwest Consortium. This program, Pathways, is designed to support comprehensive local reform efforts by providing extensive information and data on effective strategies and practices. In early spring 1995, the laboratory and Consortium made the system and the hardware and software required to use it available in 15 pilot sites. The investments in development, hardware, and software are many times larger than the investments we discuss above. It will be important to look at the benefits of this investment, too.

Networking among the Regional Consortia

Although the original vision of the Regional Consortiums Program was that it would be a national network, this idea did not receive much attention in the legislation or the solicitation for proposals. Despite the absence of attention to networking in the scope of work, some Consortium directors report that they were very much aware of this dimension of the vision and welcomed it as a potentially valuable element of their work. Forming a network could, for example, help the Consortia to become "more proactive in defining important issues." A second advantage of a national network or system, is that it permits identification of a lead organization that acts on behalf of the whole system, thus reducing redundancy and unnecessary work by other members of the system.

Accounts vary about the initial efforts to form a network among the Consortia. Consortium directors generally report that they Consortia worked reasonably well together from the beginning and that any problems that arose were problems that would normally arise as new organizations tried to form collaborative working relationships along with all of the other start-up activities. One Consortium director offered the following observations about getting the network started:

> The network took a while to develop...First, there was a lot of pressure from OERI to get the projects staffed and running smoothly as soon as possible. Several of the directors were newly employed by the labs to run the Consortium and they had to adjust to the regional lab structure as well as to the Consortium.... In some cases Consortia had to determine their niche within the lab structure.... It was difficult to focus attention on establishing a national network while trying to meet the demands from the region to provide Consortium services.... Not all of the Consortia were fully staffed the first year. For example, I came on board in November and didn't have our math and science specialists until April. We ran behind the entire first year. The second year was much easier for everyone and the directors could devote more time to collaborating at the national level.

Several of our Washington, DC-based respondents who observed the initial efforts to work together offered a different assessment of the networking activities. According to these observers, some Consortium directors were reluctant to work together and did not understand what these observers perceived to be the seriousness of initial opposition to the Consortia or see the potential benefits of working together. Instead, they were seen as thinking that "they had their grants" and a "government mandate," and that was all they needed to move ahead. In addition:

> "Most labs saw them as individual projects. They were not seen to be a national network. ... Because much of the opposition to the Consortia was driven by the SSI projects, the Consortia have to respond as a group because the SSIs were talking to each other and were a powerful group. The problem was to find a niche at the national level."

A laboratory manager, who shared some of the concerns about the seriousness of the opposition some of the Consortia were encountering saw another reason for creating a national network: "A network makes it more difficult to pick off the Consortia one by one."

Regardless of the balance of motivating factors, the Consortium staff have made a great effort to build a network. Immediately after their start-up, the Consortium directors

met together for the first time immediately prior to the OERI megameeting in December 1992. Several months later, in early 1993, Sen. Hatfield wrote to each of the Consortium directors asking them to report on whom they were working with and how, the successes they were having, the problems they were facing, the greatest needs in their regions, and progress in identifying exemplary practices. The Consortia responded by sending Sen. Hatfield individual responses and a summary report. This reporting process served two functions. First, it provided the first information about whom the Consortia were working with and what they were trying to do. Second, preparing the report stimulated the Consortia to continue to focus on their common concerns about progress and impacts. In addition to responding in writing to Sen. Hatfield, the Consortium directors and one laboratory director came together for meetings with him and OERI officials. A theme in these meetings was that the Consortia needed to find ways of working together to support mathematics and science education reforms.

People we interviewed who are familiar with the Consortia's networking activities agree that there has been progress in the development of a network among the Consortia. Joint efforts on the identification of promising practices and working with the ENC are examples of ways the Consortia have worked together, although, as we noted above in our discussion of dissemination, progress was slowed by delays in the development of the ENC. In addition, the Consortia have established five committees to address topical areas related to all of the Consortia's work: communications, technology, evaluation, development, and equity. A Consortium director recently shared several other observations about the network among the Consortia.

> "The networking has been very valuable in helping us think about the things we do. We are able to profit from other people's experiences. For example, somebody may say 'This went very well,' and we'll decide to try it. They may also say that something didn't go very well, and we'll decide not to try it. As a sign of progress of the network as well as the Consortia, people are starting to come to us to ask if they can get on our agenda. It used to be that we had to beg to get on their agenda."

> Consortium directors are particularly proud of the fact that representatives of national organizations and reform initiatives now approach them to "present at our meetings." As one put it: "It has taken three years to find our role in the national infrastructure and to develop a good working relationship."

Summary

Although the idea did not receive much attention in the authorizing legislation or in ED's scope of work for the Consortia, the development of a national network of the Regional Consortia with the ENC at the center was an important part of the original vision of the Regional Consortiums Program. Consortium staff generally recognize the benefits of networking, and, almost from the beginning, the Consortium directors have met together to discuss issues of common interest and concern, and they have collaborated on several dissemination activities. These efforts have taken place within a context that has slowed progress on creating a network: the press of getting new organizations started, establishing a role as organizational units within the regional laboratories, and delays in organizing the ENC. Important issues for future study are (1) the extent to which the Consortia will continue to work as a network; (2) whether the benefits of collaboration extend to other areas of Consortium activities and services; (3) whether the network operates as part of a national system to support reform in mathematics and science education; and (4) whether operating as a part of network achieves any economies of scale or enhances the quality of Consortium activities and services.

V CONCLUDING OBSERVATIONS ABOUT THE EISENHOWER REGIONAL MATHEMATICS AND SCIENCE EDUCATION CONSORTIUMS PROGRAM

As part of a federal strategy to support systemic reform in mathematics and science education, the Eisenhower Regional Mathematics and Science Education Consortiums Program set ambitious goals for the Regional Consortia. The Consortia were expected to work in the complex political and organizational environments of state reform initiatives, and they were expected to help teachers and others engaged in reforms at the local level.

Much of their early work involved efforts to build solid relationships with stakeholders, constituents, and potential customers. Our data suggest that the Consortia have generally succeeded in this critical task. At some Consortia, the process began as proposals were being developed and required a relatively short time. At others, progress was slower, extending into the second year of operations. Nevertheless, as many of the Consortium directors and staff with whom we spoke during our visits and interviews put it: "We have become players in math and science reform. People know that we are here and that we have valuable resources to bring to the table." Many of the people we interviewed who are familiar with the work of the Consortia agree with this assessment.

In our view, one of the most important elements of the Consortia's overall strategy for gaining recognition and access to the field has been to invite active participation in decisions about the design of Consortium activities and the allocation of Consortium resources across the regions and within states. In addition, once the priorities were set, the Consortia made it relatively easy for individuals and programs to garner Consortium resources, including funds and services. In the words of the president of a state science teachers' association from a late fall 1994 interview:

> If you had asked me what I thought of the Consortium a year ago, I would have said that we didn't have much use for it. But now things appear to be coming together. Now, my [feeling] is that it's viable and that they listen to our input. To everyone's credit, things are a lot different from the way they had been.

Some of the Consortia's work, especially their support for teams and networks, appears to serve the interests of the Consortia by creating groups and activities that, in turn, require Consortium services. If these teams do not have the authority to take advantage of Consortium activities and resources to serve their state, school district, or region, these may not be very good long-term investments in mathematics and science

reform. If these groups do assume ownership, as some appear to be doing, and if they have authority to take advantage of the services and resources available from the Consortia, these investments have the potential for large payoffs. Examining the extent to which these recipients of Consortium activities and services, particularly those provided at the state and regional levels, benefit from these services in working on mathematics and science reform will be an important topic for the next phase of this evaluation, particularly as we look more extensively at customers' perspectives on Consortium services.

The Regional Consortia also support state systemic reform efforts. Consortium staff have helped draft proposals for support for the reforms, and they have helped write curriculum framework documents. They have assisted in dissemination of materials related to the frameworks, and they have contributed to efforts to build public support for the frameworks and other reform initiatives. They also have evaluated a number of the framework projects. In addition to these direct services, they have provided funds for activities and events that might not have occurred without this support. Here again, the next round of our evaluation will, in part, rely on customers' perceptions as we look more carefully at the contributions of Consortium activities and services to the state reform initiatives. We will also be interested in looking at the extent to which the Consortia continue to contribute to the reforms, particularly as the frameworks and other activities shift to the implementation phases.

One of the basic dilemmas the Consortia face is whether to invest their relatively limited resources in activities that reach large numbers of people in limited ways or to concentrate on serving a relatively small number of people and programs more intensively. The overall portfolio of Consortium activities and services reflects efforts to do both. Events for large audiences may be useful in providing important basic information about mathematics and science reform, including information about the Consortia, but they may have limited impact beyond that, particularly in the absence of follow-up. Providing funds to individual teachers for purchasing materials and equipment or participating in professional development activities can benefit those individuals, but there may not be any multiplier effects, unless there is some follow-up or the provision of resources is contingent on commitments of resources from other sources—a strategy that several of the Consortia use. Even then, there are no guarantees.

One alternative is to invest in activities that focus at the state or regional level, on the assumption that these activities can influence policy and program design and implementation. As we have seen, a number of Consortium activities and services have

such influence as their goal. Their success is likely to depend on participants' commitment and their authority to make changes and to take advantage of Consortium resources and services. Choosing to work at the state level carries the challenge, and the incumbent risks, of working through a crowded, not always friendly reform arena to find a viable role. Just getting started can take a lot of time. Alternatively, there appear to be fewer risks in working at a regional level, in part because there are less obvious threats to turf boundaries. Getting started thus is probably easier and less time-consuming. A risk that does exist is that working at a regional level can result in working at such a high level of generality that no one really benefits or is interested. As the director of a state Eisenhower program observed:

> They are doing joint planning with all of the states in the region, but I don't see how they are going to develop a regional plan that will meet the needs of all of the states. For example, (state) has had outcomes-based education for four or five years. In (state) with a new governor and state superintendent, there is a movement away from outcomes-based education and back to the basics.

As we reported in reviewing the history of the Regional Consortiums Program, one of the early expectations for the Consortia was that they would coalesce into a network organized around the ENC and that this network would enhance the service capacity of the individual Consortia. What we found is that early progress on forming the network was impeded by delays in organizing the ENC and the competing demands of operating the individual Consortia. Our conclusion is that the Consortia are indeed coalescing into a network and that there is considerable collaboration on dissemination activities. An important issue for the next phase of this evaluation will be to look more closely at the Consortium network to see whether it continues to develop as a vehicle for bringing the Consortia together as a system and for coordinating resources and services, while achieving some economies of scale.

In addition to the development of a national network, a second expectation for the Consortia was that they would develop a new approach to technical assistance, in part through the use of technology. All of the Consortia are working on this challenge; several of them have eagerly embraced it. Consortia have provided the resources necessary—including hardware, software, and training—for hundreds, perhaps even thousands, of people to gain access to the Internet or to one of the gateways to the Internet, such as America Online. In addition, the Consortia have developed databases of information relevant to mathematics and science education reform. As we noted above, the databases

vary considerably in scope, content, and format. The Consortia, working with the ENC, are also operating technology demonstration sites. The organization and location of several of these sites (e.g., mobile sites and sites located in larger math- and science-rich centers) represent promising strategies for increasing the amount of information available to users and making it easier for them to gain access to it. Finally, at least one Consortium has used new electronic communication systems to facilitate communications within a number of professional networks the Consortium has created. Together, these efforts to use technology in support of dissemination and communication represent a potentially important contribution to mathematics and science education reform. They are also likely to generate valuable insights about the uses of technology in dissemination, technical assistance, and professional development. A final challenge to the evaluation team will be to examine the contributions of this aspect of the Consortia's work and to understand the lessons that can be learned from it.

In summary, the activities and services of the Regional Consortia during their first few years represent a considerable effort to meet the needs of their states and regions. Given the magnitude of the needs and a context of ongoing reform efforts in almost all states, the Consortia have had to make hard choices about where to invest their relatively scarce resources. All Consortia have focused a reasonable amount of attention on the content of reform—providing access to innovative mathematics and science curricula, disseminating information on effective instructional strategies, and helping states and locals with the tough job of developing or adapting new assessment instruments. Nevertheless, a central finding of this preliminary round of our evaluation is that, across the Consortia, there has been a greater focus on providing procedural help in their regions. Consortia staff have devoted considerable time to building state teams, creating electronic networks, and planning and facilitating meetings and other events.

The greater emphasis on process issues made sense in the Consortia's early years: it took advantage of the strengths of the regional educational laboratories as institutions and of many of the Consortia staff's experience while placing the Consortia in an explicitly supportive role at a time when states were unsure whether they wanted the offered assistance. Now that the Consortia have entered into partnerships with many of the states and have a better grasp of the needs of the states and regions, the mix of activities and services may change. The ultimate goal of the Consortia is to support the improvement of mathematics and science education across their regions. The strategies the Consortia will need to devise to meet this goal will vary, given the needs and capacity of their many

constituents. Most importantly, the Consortia will be challenged to ensure that such strategies hold explicit promise of influencing the improvement of the teaching and learning of mathematics and science. How the Consortia choose to address these challenges and their success in doing so will be the focus of our future evaluation activities.

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☆ U.S. GOVERNMENT PRINTING OFFICE: 1996-720-241